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(54) Title: ANHYDROUS COSMETIC COMPOSITIONS

(57) Abstract: An anhydrous skin treatment composition is provided which includes a crosslinked siloxane elastomer gel of specific yield point, a skin conditioning agent and a volatile siloxane. Inclusions of the select elastomers provide improved uniform distribution of the pigments.

ANHYDROUS COSMETIC COMPOSITIONS  
CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/217,040, filed July 10, 2000.

FIELD OF THE INVENTION

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The invention relates to anhydrous cosmetic compositions comprising elastomeric silicones of specific particle size and viscosity.

BACKGROUND OF THE INVENTION

Emollients including organic esters and hydrocarbons, especially petrolatum, have long  
10 been used medicinally as skin conditioning agents. These substances are second only to water as moisturizing ingredients of choice. They function primarily as an occlusive barrier. The water content of the outer layers of human skin stratum corneum is a controlling factor in the appearance of dry skin symptoms. When the stratum corneum contains an adequate amount of water within the range of ten to twenty percent, the skin remains flexible. However, when the  
15 water content falls below ten percent the stratum corneum often becomes brittle and rough and can exhibit scaling and cracking.

The stratum corneum receives its water from the deep layers of the epidermis by diffusion or when it is brought into direct contact with water. The diffusion process is controlled by the water content of the skin as well as the concentration gradient. In a very dry environment,  
20 the water loss from the external skin layers can be significant and often exceeds the rate of replacement by diffusion. An occlusive or semi-occlusive barrier substance placed on the surface of the skin acts to retard water loss to the environment. It also allows the skin surface to rehydrate via a diffusion mechanism.

While there are many effective and economical skin-conditioning agents, they  
25 nevertheless suffer from certain disadvantages.

Often the emollient types are delivered as water-in-oil emulsions. It is difficult to attain the critical formula balance between oil and water phases to an extent sufficient to ensure long-term storage stability. One part of this critical balance is the internal phase volume. A critical volume must be obtained to maximize the chemical and physical interactions that produce and  
30 stabilize the system. If this critical volume is not balanced properly the product may suffer from viscosity change and eventual phase separation. Usually the optimum volume is quite large which limits the external phase volume size, and gives the system a draggy unfavorable slow

break attribute. This critical internal phase volume restriction can reduce functionality and add unfavorable feel characteristics.

Anhydrous systems avoid emulsion stability problems. Unfortunately other aesthetic issues arise with anhydrous systems. Not all oily phase materials are compatible at high concentration. Moreover, occlusive agents such as petrolatum are relatively greasy. They suffer the disadvantage of transfer onto clothing and are not easily removed from the skin by washing with soap. Neither do they allow for adequate penetration into the epidermis.

New systems are needed which avoid such problems as greasy feel and which address the "transfer" typically associated with anhydrous products.

Accordingly, one aspect of the present invention is to provide cosmetic compositions that are anhydrous yet provides improved skin-feel properties.

Another aspect of the present invention is to provide a skin treatment composition that has stability against phase separation even under freeze/thaw cycling.

Still another aspect of the present invention is to provide a skin treatment composition which achieves a smooth non-draggy rub-in upon initial application to the skin and which is not easily removed from the skin with water.

These and other aspects of the present invention will become more readily apparent from consideration of the following summary and detailed description.

#### SUMMARY OF THE INVENTION

The present invention relates to anhydrous cosmetic compositions comprising:

(i) at least one fatty or oil phase comprising:

(a) from about 0.1 to about 10% of non-spherical crosslinked siloxane elastomer having a particle size of from above 10 to about 200 microns wherein the crosslinked siloxane elastomer is capable of swelling and absorbing greater than 30% by weight of a solvent fluid;

(b) from about 10 to about 80% of a solvent for the crosslinked siloxane elastomer, wherein the solvent forms a gel with the crosslinked siloxane elastomer having yield point of at least 50 Pa;

(ii) from about 0.1% to about 10% of an emulsifier;

(iii) from about 0.1% to about 50% of a humectant;

(iv) optionally, from 0 to about 50% of skin conditioning agent;

(v) from about 0.1% to about 30% pigment; and

(vi) from 0 to about 5% water

wherein the composition has a yield point of from about 100, preferably from about 400, to about 4000, preferably to about 2000 Pa and wherein the oil or fatty phase of the composition contains less than 10% by weight solids or solid materials and further wherein the gel formed by the solvent and crosslinked siloxane elastomer provides an even, uniform distribution of the pigments in the film and, prior to film drying, the pigments are embedded in the film. Preferably, the compositions are opaque and preferably comprise a cosmetic base for the silicone elastomer gel that is substantially free of silicone oil.

Also claimed herein are anhydrous cosmetic compositions comprising:

- (i) at least one fatty or oil phase comprising:
  - (a) from about 0.1 to about 10% of non-spherical crosslinked siloxane elastomer having a viscosity of from above 20,000 to about 6,000,000 cps wherein the crosslinked siloxane elastomer is capable of swelling and absorbing greater than 30% by weight of a solvent fluid;
  - (b) from about 10 to about 80% of a solvent for the crosslinked siloxane elastomer, wherein the solvent forms a gel with the crosslinked siloxane elastomer having yield point of at least 50 Pa;
- (ii) from about 0.1% to about 10% of an emulsifier;
- (iii) from about 0.1% to about 50% of a humectant;
- (iv) optionally, from 0 to about 50% of skin conditioning agent;
- (v) from about 0.1% to about 30% pigment; and
- (vi) from 0 to about 5% water

wherein the composition has a yield point of from about 100, preferably from about 400, to about 4000, preferably to about 2000 Pa and wherein the oil or fatty phase of the composition contains less than 10% by weight solids or solid materials and further wherein the gel formed by the solvent and crosslinked siloxane elastomer provides an even, uniform distribution of the pigments in the film and, prior to film drying, the pigments are embedded in the film such that substantially no pigment resides on or protrudes through the surface of the film.

Also disclosed herein are cosmetic compositions comprising:

- (i) from about 0.1% to about 15% of crosslinked siloxane elastomer having an average particle size less than 20 microns;
- (ii) from about 10 to about 80% of a solvent for the crosslinked siloxane elastomer;
- (iii) optionally, from 0 to about 50% of skin conditioning agent; and
- (iv) optionally, from above about 0 to about 95% of water

wherein the composition contains at least about 1% air.

#### DETAILED DESCRIPTION OF THE INVENTION

As used herein, the term "cosmetics" includes make-up, foundation, and skin care products. The term "make-up" refers to products that leave color on the face, including  
5 foundation, blacks and browns, i.e., mascara, concealers, eye liners, brow colors, eye shadows, blushers, lip colors, powders, solid emulsion compact, and so forth. "Skin care products" are those used to treat or care for, or somehow moisturize, improve, or clean the skin. Products contemplated by the phrase "skin care products" include, but are not limited to, adhesives, bandages, toothpaste, anhydrous occlusive moisturizers, antiperspirants, deodorants, personal  
10 cleansing products, powder laundry detergent, fabric softener towels, occlusive drug delivery patches, nail polish, powders, tissues, wipes, hair conditioners-anhydrous, shaving creams, antiwrinkle or line-minimizing products and the like. The term "foundation" refers to liquid, creme, mousse, pancake, compact, concealer or like product created or reintroduced by cosmetic companies to even out the overall coloring of the skin. Foundation is manufactured to work better  
15 over moisturized and/or oiled skin. The compositions of the present invention also provide good make-up removal. As used herein, "excess moisture" means an undesirable and/ or unhealthy level of bodily fluids deposited on human skin. The compositions of the present invention are especially useful in removal make-up compositions such as that disclosed in US Patent 6,019,962 to Rabe et al., which patent is herein incorporated by reference in its entirety.

20 The term "ambient conditions" as used herein refers to surrounding conditions under about one atmosphere of pressure, at about 50% relative humidity, and at about 25°C, unless otherwise specified.

The term "yield point," as used herein is non-directional and refers to initial resistance to flow under applied stress; and is measured using Haake Controlled Stress Rheometer RS150  
25 with a 35mm/4 deg. cone and plate.

The term "solids" or "solid material", as used herein refers to elastomeric organopolysiloxane particles and spherical particles.

The term "opaque" refers to a composition that is impervious to visible light. An opaque composition lacks any degree of transparency.

30 By the phrase "substantially free of silicone oil," as it relates to the cosmetic base of the present invention, means that the cosmetic base, into which the silicone elastomer gel is incorporated, contains less than about 5% silicone oil, preferably less than 3% silicone oil, more

preferably less than 1% silicone oil, optimally less than 0.1% silicone oil, by weight of the total composition or composition as a whole.

The phrase "cosmetic base" refers to a vehicle or cosmetically acceptable carrier for the components of the present invention.

5       The term "cosmetically acceptable carrier" refers to a vehicle, for cosmetic use, which vehicle delivers the components (together with any skin care actives) to the intended target and which will not cause harm to humans or other recipient organisms. As used herein, "cosmetic" will be understood to encompass both human and animal cosmetics.

10       As used herein the term "comprising" means that the composition can contain other ingredients which are compatible with the composition and which preferably do not substantially disrupt the compositions of the present invention. The term encompasses the terms "consisting of" and "consisting essentially of".

15       Unless otherwise indicated, all percentages and ratios used herein are by weight of the total composition. All weight percentages, unless otherwise indicated, are on an actives weight basis. All measurements made are at 25°C, unless otherwise designated.

#### Crosslinked Siloxane Elastomer

20       An essential component of the present invention is a crosslinked organopolysiloxane elastomer. No specific restriction exists as to the type of curable organopolysiloxane composition that can serve as the starting material for the crosslinked organopolysiloxane elastomer. Examples in this respect are addition reaction-curing organopolysiloxane compositions which cure under platinum metal catalysis by the addition reaction between SiH-containing diorganopolysiloxane and organopolysiloxane having silicon-bonded vinyl groups; condensation-curing organopolysiloxane compositions which cure in the presence of an organotin compound by a dehydrogenation reaction between hydroxyl-terminated diorganopolysiloxane and  
25       SiH-containing diorganopolysiloxane; condensation-curing organopolysiloxane compositions which cure in the presence of an organotin compound or a titanate ester, by a condensation reaction between an hydroxyl-terminated diorganopolysiloxane and a hydrolyzable organosilane (this condensation reaction is exemplified by dehydration, alcohol-liberating, oxime-liberating, amine-liberating, amide-liberating, carboxyl-liberating, and ketone-liberating reactions);  
30       peroxide-curing organopolysiloxane compositions which thermally cure in the presence of an organoperoxide catalyst; and organopolysiloxane compositions which are cured by high-energy radiation, such as by gamma-rays, ultraviolet radiation, or electron beams.

Addition reaction-curing organopolysiloxane compositions are preferred for their rapid curing rates and excellent uniformity of curing. A particularly preferred addition reaction-curing organopolysiloxane composition is prepared from:

- (A) an organopolysiloxane having at least 2 lower alkenyl groups in each molecule;
- 5 (B) an organopolysiloxane having at least 2 silicon-bonded hydrogen atoms in each molecule; and
- (C) a platinum-type catalyst.

With regard to the above, component (A) is the basic component of the silicone elastomer-generating organopolysiloxane, and curing proceeds by the addition reaction of this component with component (B) under catalysis by component (C). This component (A) must  
10 contain at least 2 silicon-bonded lower alkenyl groups in each molecule; an excellent cured product will not be obtained at fewer than two lower alkenyl groups because a network structure will not be formed. Said lower alkenyl groups are exemplified by vinyl, allyl, and propenyl. While the lower alkenyl groups can be present at any position in the molecule, their presence at  
15 the molecular terminals is preferred. The molecular structure of this component may be straight chain, branched straight chain, cyclic, or network, but a straight chain, possibly slightly branched, is preferred. The molecular weight of the component is not specifically restricted, and thus the viscosity may range from low viscosity liquids to very high viscosity gums. In order for the cured product to be obtained in the form of the rubbery elastomer, it is preferred that the viscosity  
20 at 25°C be at least 100 centistokes. These organopolysiloxanes are exemplified by methylvinylsiloxanes, methylvinylsiloxane-dimethylsiloxane copolymers, dimethylvinylsiloxyl-terminated dimethylpolysiloxanes, dimethylvinylsiloxyl-terminated dimethylsiloxane-methylphenylsiloxane copolymers, dimethylvinylsiloxyl-terminated dimethylsiloxane-diphenylsiloxane-methylvinylsiloxane copolymers, trimethylsiloxyl-terminated dimethylsiloxane-methylvinylsiloxane  
25 copolymers, trimethylsiloxyl-terminated dimethylsiloxane-methylphenylsiloxane-methylvinylsiloxane copolymers, dimethylvinylsiloxyl-terminated methyl(3,3,3-trifluoropropyl) polysiloxanes, and dimethylvinylsiloxyl-terminated dimethylsiloxane-methyl(3,3-trifluoropropyl)siloxane copolymers.

Component (B) is an organopolysiloxane having at least 2 silicon-bonded hydrogen  
30 atoms in each molecule and is a crosslinker for component (A). Curing proceeds by the addition reaction of the silicon-bonded hydrogen atoms in this component with the lower alkenyl groups in component (A) under catalysis by component (C). This component (B) must contain at least 2 silicon-bonded hydrogen atoms in each molecule in order to function as a crosslinker.

Furthermore, the sum of the number of alkenyl groups in each molecule of component (A) and the number of silicon-bonded hydrogen atoms in each molecule of component (B) is to be at least 5. Values below 5 should be avoided because a network structure is then essentially not formed.

No specific restriction exists on the molecular structure of this component, and it may be any of straight chain, branch-containing straight chain, cyclic, etc. The molecular weight of this component is not specifically restricted, but it is preferred that the viscosity at 25°C be 1 to 50,000 centistokes in order to obtain good miscibility with component (A). It is preferred that this component be added in a quantity such that the molar ratio between the total quantity of silicon-bonded hydrogen atoms in the instant component and the total quantity of all lower alkenyl groups in component (A) falls within the range of 1.5:1 to 20:1. It is difficult to obtain good curing properties when this molar ratio falls below 0.5:1. When 20:1 is exceeded, there is a tendency for the hardness to increase to high levels when the cured product is heated. Furthermore, when an organosiloxane containing substantial alkenyl is supplementarily added for the purpose of; for example, reinforcement, it is preferred that a supplemental addition of the instant SiH-containing component be made in a quantity offsetting these alkenyl groups. This component is concretely exemplified by trimethylsiloxy-terminated methylhydrogenpolysiloxanes, trimethylsiloxy-terminated dimethylsiloxane-methylhydrogensiloxane copolymers, and dimethylsiloxane-methylhydrogen-siloxane cyclic copolymers.

Component (C) is a catalyst of the addition reaction of silicon-bonded hydrogen atoms and alkenyl groups, and is concretely exemplified by chloroplatinic acid, possibly dissolved in an alcohol or ketone and this solution optionally aged, chloroplatinic acid-olefin complexes, chloroplatinic acid-alkenylsiloxane complexes, chloroplatinic acid-diketone complexes, platinum black, and carrier-supported platinum.

This component is added preferably at 0.1 to 1,000 weight parts, and more preferably at 1 to 100 weight parts, as platinum-type metal proper per 1,000,000 weight parts of the total quantity of components (A) plus (B). Other organic groups which may be bonded to silicon in the organopolysiloxane forming the basis for the above-described curable organopolysiloxane compositions are, for example, alkyl groups such as methyl, ethyl, propyl, butyl, and octyl; substituted alkyl groups such as 2-phenylethyl, 2-phenylpropyl, and 3,3,3-trifluoropropyl; aryl groups such as phenyl, tolyl, and xylyl; substituted aryl groups such as phenylethyl; and monovalent hydrocarbon groups substituted by, for example, the epoxy group, the carboxylate ester group, the mercapto group, etc.



Examples of the production of the organopolysiloxane elastomer powder are as follows:  
an organopolysiloxane composition as described above (additional-curable, condensation-curable, or peroxide-curable) is mixed with water in the presence of a surfactant (nonionic, anionic, cationic, or amphoteric), and, after mixing to homogeneity in a homomixer, colloid mill,  
5 homogenizer, propeller mixer, etc., this is cured by discharge into hot water (temperature at least 50°C) and is then dried; the organopolysiloxane composition (addition-curable, condensation-curable, or peroxide-curable) is cured by spraying it directly into a beated current; the powder is obtained by curing a radiation-curable organopolysiloxane composition by spraying it under high energy radiation; the organopolysiloxane composition (addition-curable, condensation-curable,  
10 peroxide-curable) or high energy-curable organopolysiloxane composition is cured, the latter by high energy radiation, and the product is then pulverized using a known pulverizer such as, for example, a ball mill, atomizer, kneader, roll mill, etc., to thereby form the powder. Suitable organopolysiloxane elastomer powders include vinyl dimethicone/methicone silsesquioxane crosspolymers like Shin-Etsu's KSP-100, KSP-101, KSP-102, KSP-103, KSP-104, KSP-105,  
15 hybrid silicone powders that contain a fluoroalkyl group like Shin-Etsu's KSP-200, and hybrid silicone powders that contain a phenyl group such as Shin-Etsu's KSP-300; and Dow Corning's DC 9506.

Preferred organopolysiloxane compositions are dimethicone/vinyl dimethicone crosspolymers. Such dimethicone/vinyl dimethicone crosspolymers are supplied by a variety of  
20 suppliers including Dow Corning (DC 9040 and DC 9041), General Electric (SFE 839), Shin Etsu (KSG-15, 16, 18 [dimethicone /phenyl vinyl dimethicone crosspolymer]), Grant Industries (Gransil™ line of materials), and lauryl dimethicone/vinyl dimethicone crosspolymers supplied by Shin Etsu (e.g., KSG-31, KSG-32, KSG-41, KSG-42, KSG-43, and KSG-44). Cross-linked organopolysiloxane elastomers useful in the present invention and processes for making them are  
25 further described in US Patent 4,970,252 to Sakuta et al., issued November 13, 1990; US Patent 5,760,116 to Kilgour et al., issued June 2, 1998; US Patent 5,654,362 to Schulz, Jr. et al. issued August 5, 1997; and Japanese Patent Application JP 61-18708, assigned to Pola Kasei Kogyo KK, each of which are herein incorporated by reference in its entirety. Silicone elastomers of the type described in US Patents 5,412,004 (issued 5/2/95); 5,837,793 (issued 11/17/98); and  
30 5,811,487 (issued 9/22/98), all of which patents are herein incorporated by reference in their entirety, are also useful herein. Preferably the elastomers of the present invention are cured under anhydrous conditions or in an anhydrous environment.

The cross-linked organopolysiloxane elastomers of the present invention are preferably further processed by subjecting them to a high shear (approximately 5,000 psi) treatment in the presence of a solvent for the siloxane elastomer via a Sonolator at less than 10 passes. Sonolation achieves a resultant composition with elastomer average particle size ranging from  
5 above 10 (or above about 10) microns to about 200 microns, preferably from about 20 to about 150 microns, more preferably from above 30 (or above about 30) to about 100 microns, most preferably from about 40 microns to about 95 microns, and, optimally, from above 50 microns to about 90 microns as measured by the Horiba LA-910 (described below). As used herein, the term  
10 "particle size" of the elastomer represents the elastomer particle size in its swelled state. By "swelled," as used herein, means that the elastomer particles have extended beyond their normal size and shape by virtue of their absorption of the solvent compound. Viscosity is best when ranging between above 20,000 (or above about 20,000) and about 6,000,000, preferably from about 30,000 to about 4,000,000, more preferably from about 40,000 to about 3,000,000, most preferably from about 60,000 to about 2,000,000, optimally about 70,000 to about 1,500,000 cps  
15 at 25°C as measured by a Brookfield LV Viscometer (size 4 bar, 60 rpm, 0.3 sec.).

Without being limited by theory, the present inventors believe that compositions incorporating elastomer/solvent gels where the elastomer has an average particle size greater than 10 microns (or greater than about 10 microns) and/or viscosities greater than 20,000 cps provide films having improved smoothness as well as improved uniformity and evenness of particle (e.g.,  
20 pigments) distribution within the film (i.e., solid particles remain distributed within and throughout the film as opposed to such particles protruding from the film into and/or across the film/air interface).

Preferably, the cross-linked organopolysiloxane elastomers do not undergo recycled processing. Without being limited by theory, recycled processing produces broad particle size  
25 distributions comprising particles larger or smaller than that necessary to achieve the skin feel benefits of the present invention. Specifically, gel balls often result from silicone elastomer particles larger than 200 microns while elastomer particles smaller than 10 microns reduce skin feel and viscosity benefits. Such particle size distributions result from a failure to ensure that all of the elastomer particle materials experience the same shear throughout the process. Typically,  
30 with recycling, only a portion of the particles experience shear before these sheared particles are returned to the process starting point and combined with the remaining un-sheared particles. Similarly, the next cycle begins with only a portion of this particle mixture experiencing shear before the newly sheared mixture particles are returned to the process starting point and

combined with the remaining un-sheared particle mixture. Importantly, even after considerable recycling, some of the particles never actually experience shear while others experience a high degree of shear. The result is a particle size range that encompasses particles both larger and smaller than those necessary to achieve the present invention.

5 In contrast, discrete pass processing, as alluded to above, ensures that all the particles experience shear as well as the same amount of shear with each run or pass. More specifically, no run or pass is completed until all the particles have experienced the same shear force. Consequently, the particle size distribution is narrower than that produced by "recycling" with respect to specific particle sizes. This results in a better balance between gel ball formation and  
10 viscosity as well as skin feel and viscosity.

Preferably the crosslinked organopolysiloxane elastomer is non-emulsifying. The term "non-emulsifying," as used herein, defines crosslinked organopolysiloxane elastomer from which polyoxyalkylene units are absent.

Preferably the cross-linked siloxane elastomer is non-spherical. By the term "non-  
15 spherical" as used herein means that the siloxane elastomer particles are not spherical, and preferably not spheroidal. Without being limited by theory, the present inventors believe that spherical particles fail to provide the rheology and film properties necessary to achieve the benefits of the present invention. Specifically, when forming the gel matrix or network, spherical particles do not swell to the extent and/or pack as tightly as non-spherical particles.

20 Amounts of the elastomer may range from about 0.1 to about 10%, optimally from about 1 to about 8%, most preferably from about 3 to about 6% by weight.

#### Solvent for the Crosslinked Siloxane Elastomer

The compositions of the present invention comprise a solvent for the crosslinked organopolysiloxane elastomer described hereinbefore. The solvent, when combined with the  
25 cross-linked organopolysiloxane elastomer particles, serves to suspend and swell the elastomer particles to provide an elastic, gel-like network or matrix. The solvent for the cross-linked siloxane elastomer is liquid under ambient conditions, and preferably has a low viscosity to provide for improved spreading on the skin.

Concentrations of the solvent in the cosmetic compositions of the present invention will  
30 vary primarily with the type and amount of solvent and the cross-linked siloxane elastomer employed. Preferred concentrations of the solvent are from about 10% to about 90%, preferably from about 20% to about 80%, more preferably from about 30% to about 70%, by weight of the composition.

The solvent for the cross-linked siloxane elastomer comprises one or more liquid carriers suitable for topical application to human skin. These liquid carriers may be organic, silicone-containing or fluorine-containing, volatile or non-volatile, polar or non-polar, provided that the liquid carrier forms a solution or other homogenous liquid or liquid dispersion with the selected cross-linked siloxane elastomer at the selected siloxane elastomer concentration at a temperature of from about 28°C to about 250°C, preferably from about 28°C to about 100°C, preferably from about 28°C to about 78°C. The solvent for the cross-linked siloxane elastomer preferably has a solubility parameter of from about 3 to about 13 (cal/cm<sup>3</sup>)<sup>0.5</sup>, more preferably from about 5 to about 11 (cal/cm<sup>3</sup>)<sup>0.5</sup>, most preferably from about 5 to about 9 (cal/cm<sup>3</sup>)<sup>0.5</sup>.

Solubility parameters for the liquid carriers or other materials, and means for determining such parameters, are well known in the chemical arts. A description of solubility parameters and means for determining them are described by C. D. Vaughan, "Solubility Effects in Product, Package, Penetration and Preservation" 103 *Cosmetics and Toiletries* 47-69, October 1988; and C. D. Vaughan, "Using Solubility Parameters in Cosmetics Formulation", 36 *J. Soc. Cosmetic Chemists* 319-333, September/October, 1988, which articles are incorporated herein by reference.

The solvent preferably includes volatile, non-polar oils; non-volatile, relatively polar oils; non-volatile, non-polar oils; and non-volatile paraffinic hydrocarbon oils; each discussed more fully hereinafter. The term "non-volatile" as used herein refers to materials which exhibit a vapor pressure of no more than about 0.2 mm Hg at 25°C at one atmosphere and/or to materials which have a boiling point at one atmosphere of at least about 300° C. The term "volatile" as used herein refers to all materials that are not "non-volatile" as previously defined herein. The phrase "relatively polar" as used herein means more polar than another material in terms of solubility parameter; i.e., the higher the solubility parameter the more polar the liquid.

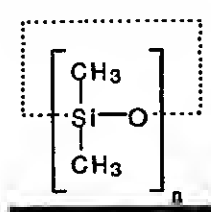
The term "non-polar" typically means that the material has a solubility parameter below about 6.5 (cal/cm<sup>3</sup>)<sup>0.5</sup>.

#### 1. Non-polar, Volatile Oils

The non-polar, volatile oil tends to impart highly desirable aesthetic properties to the compositions of the present invention. Consequently, the non-polar, volatile oils are preferably utilized at a fairly high level. Non-polar, volatile oils particularly useful in the present invention are selected from the group consisting of silicone oils; hydrocarbons; and mixtures thereof. Such non-polar, volatile oils are disclosed, for example, in *Cosmetics, Science, and Technology*, Vol. 1, 27-104 edited by Balsam and Sagarin, 1972. The non-polar, volatile oils useful in the

present invention may be either saturated or unsaturated, have an aliphatic character and be straight or branched chained or contain alicyclic or aromatic rings. Examples of preferred non-polar, volatile hydrocarbons include polydecenes such as isododecene and isodecene (e.g., Permethyl-99A which is available from Presperse Inc.) and the C7 -C8 through C12 -C15 isoparaffins (such as the Isopar Series available from Exxon Chemicals). Non-polar, volatile liquid silicone oils are disclosed in U.S. Patent 4,781,917 issued to Luebke et al. on Nov. 1, 1988, herein incorporated by reference in its entirety. Additionally, a description of various volatile silicones materials is found in Todd et al., "Volatile Silicone Fluids for Cosmetics", Cosmetics and Toiletries, 91:27-32 (1976), herein incorporated by reference in its entirety.

Particularly preferred volatile silicone oils are selected from the group consisting of cyclic volatile silicones corresponding to the formula:



wherein n is from about 3 to about 7; and linear volatile silicones corresponding to the formula:



wherein m is from about 1 to about 7. Linear volatile silicones generally have a viscosity of less than about 5 centistokes at 25°C, whereas the cyclic silicones have viscosities of less than about 10 centistokes at 25°C. Highly preferred examples of volatile silicone oils include cyclomethicones of varying viscosities, e.g., Dow Corning 200, Dow Corning 244, Dow Corning 245, Dow Corning 344, and Dow Corning 345, (commercially available from Dow Corning Corp.); SF-1204 and SF-1202 Silicone Fluids (commercially available from G.E. Silicones), GE 7207 and 7158 (commercially available from General Electric Co.); and SWS-03314 (commercially available from SWS Silicones Corp.).

## 2. Relatively Polar, Non-volatile oils

The non-volatile oil is "relatively polar" as compared to the non-polar, volatile oil discussed above. Therefore, the non-volatile co-solvent is more polar (i.e., has a higher solubility parameter) than at least one of the non-polar, volatile oils. Relatively polar, non-volatile oils potentially useful in the present invention are disclosed, for example, in Cosmetics, Science, and Technology, Vol. 1, 27-104 edited by Balsam and Sagarin, 1972; U.S. Patents 4,202,879 issued to Shelton on May 13, 1980; and 4,816,261 issued to Luebke et al. on Mar. 28,

1989, all of which are herein incorporated by reference in their entirety. Relatively polar, non-volatile oils useful in the present invention are preferably selected from the group consisting of silicone oils; hydrocarbon oils; fatty alcohols; fatty acids; esters of mono and dibasic carboxylic acids with mono and polyhydric alcohols; polyoxyethylenes; polyoxypropylenes; mixtures of polyoxyethylene and polyoxypropylene ethers of fatty alcohols; and mixtures thereof. The relatively polar, non-volatile co-solvents useful in the present invention may be either saturated or unsaturated, have an aliphatic character and be straight or branched chained or contain alicyclic or aromatic rings. More preferably, the relatively polar, non-volatile liquid co-solvent are selected from the group consisting of fatty alcohols having from about 12-26 carbon atoms; fatty acids having from about 12-26 carbon atoms; esters of monobasic carboxylic acids and alcohols having from about 14-30 carbon atoms; esters of dibasic carboxylic acids and alcohols having from about 10-30 carbon atoms; esters of polyhydric alcohols and carboxylic acids having from about 5-26 carbon atoms; ethoxylated, propoxylated, and mixtures of ethoxylated and propoxylated ethers of fatty alcohols with from about 12-26 carbon atoms and a degree of ethoxylation and propoxylation of below about 50; and mixtures thereof. More preferred are propoxylated ethers of C14 -C18 fatty alcohols having a degree of propoxylation below about 50, esters of C2 -C8 alcohols and C12-C26 carboxylic acids (e.g. ethyl myristate, isopropyl palmitate), esters of C12-C26 alcohols and benzoic acid (e.g. Finsolv TN supplied by Finetex), diesters of C2-C8 alcohols and adipic, sebacic, and phthalic acids (e.g., diisopropyl sebacate, diisopropyl adipate, di-n-butyl phthalate), polyhydric alcohol esters of C6 -C26 carboxylic acids (e.g., propylene glycol dicaprate/dicaprylate, propylene glycol isostearate); and mixtures thereof. Even more preferred are branched-chain aliphatic fatty alcohols having from about 12-26 carbon atoms. Even more preferred are isocetyl alcohol, octyldecanol, octyldodecanol and undecylpentadecanol; and most preferred is octyldodecanol. Such preferred aliphatic fatty alcohols are particularly useful in combination with the volatile liquid silicone oils discussed herein to adjust the average solubility of the solvent.

### 3. Non-polar, Non-volatile oils

In addition to the liquids discussed above, the solvent for the cross-linked siloxane elastomer may optionally include non-volatile, non-polar oils. Typical non-volatile, non-polar emollients are disclosed, for example, in *Cosmetics, Science, and Technology*, Vol. 1, 27-104 edited by Balsam and Sagarin, 1972; U.S. Patents 4,202,879 issued to Shelton on May 13, 1980; and 4,816,261 issued to Luebke et al. on Mar. 28, 1989, both of which are herein incorporated by reference. The non-volatile oils useful in the present invention are essentially non-volatile

polysiloxanes, paraffinic hydrocarbon oils, and mixtures thereof. The polysiloxanes useful in the present invention selected from the group consisting of polyalkylsiloxanes, polyarylsiloxanes, polyalkylarylsiloxanes, poly-ethersiloxane copolymers, and mixtures thereof. Examples of these include polydimethyl siloxanes having viscosities of from about 1 to about 100,000 centistokes at 25°C. Among the preferred non-volatile silicone emollients useful in the present compositions are the polydimethyl siloxanes having viscosities from about 2 to about 400 centistokes at 25°C. Such polyalkylsiloxanes include the Viscasil series (sold by General Electric Company) and the Dow Corning 200 series (sold by Dow Corning Corp.). Polyalkylarylsiloxanes include polymethylphenyl siloxanes having viscosities of from about 15 to about 65 centistokes at 25°C. These are available, for example, as SF 1075 methyl-phenyl fluid (sold by General Electric Company) and 556 Cosmetic Grade Fluid (sold by Dow Corning Corp.). Useful polyethersiloxane copolymers include, for example, a polyoxyalkylene ether copolymer having a viscosity of about 1200 to 1500 centistokes at 25°C. Such a fluid is available as SF1066 organosilicone surfactant (sold by General Electric Company). Polysiloxane ethylene glycol ether copolymers are preferred copolymers for use in the present compositions.

Non-volatile paraffinic hydrocarbon oils useful in the present invention include mineral oils and certain branched-chain hydrocarbons. Examples of these fluids are disclosed in U.S. Patent 5,019,375 issued to Tanner et al. on May 28, 1991, herein incorporated by reference in its entirety. Preferred mineral oils have the following properties:

- (1) viscosity from about 5 centistokes to about 70 centistokes at 40°C;
- (2) density between about 0.82 and 0.89 g/cm<sup>3</sup> at 25°C;
- (3) flash point between about 138°C and about 216°C; and
- (4) carbon chain length between about 14 and about 40 carbon atoms.

Preferred branched chain hydrocarbon oils have the following properties:

- (1) density between about 0.79 and about 0.89 g/cm<sup>3</sup> at 20°C
- (2) boiling point greater than about 250°C; and
- (3) flash point between about 110°C and about 200°C.

Particularly preferred branched-chain hydrocarbons include Permethyl 103 A, which contains an average of about 24 carbon atoms; Permethyl 104A, which contains an average of about 68 carbon atoms; Permethyl 102A, which contains an average of about 20 carbon atoms; all of which may be purchased from Permethyl Corporation; and Ethylflo 364 which contains a mixture of 30 carbon atoms and 40 carbon atoms and may be purchased from Ethyl Corp.

When used herein, volatile or non-volatile hydrocarbon oils are preferably present at concentrations less than 30%, more preferably, from about 1% to about 25%, most preferably from about 1% to about 15%.

Additional solvents useful herein are described in US Patent 5,750,096 to Gerald J. Guskey et al., issued May 12, 1998, herein incorporated by reference in its entirety.

#### Humectants

The compositions of the present invention also comprise humectants. Humectants are polyhydric alcohols intended for moisturizing, reducing scaling and stimulating removal of built-up scale from the skin. Typical polyhydric alcohols include polyalkylene glycols and more preferably alkylene polyols and their derivatives. Illustrative are propylene glycol, dipropylene glycol, polypropylene glycol, polyethylene glycol, sorbitol, hydroxypropyl sorbitol, hexylene glycol, 1,3-butylene glycol, 1,2,6-hexanetriol, ethoxylated glycerin, propoxylated glycerin and mixtures thereof. Most preferably the humectant is glycerin. When present, amounts of humectant may range anywhere from 0.1 to 50%, preferably 5 to 45%, more preferably from 10 to 40%, most preferably from about 15% to about 40%, optimally from 25% to 35% by weight.

#### Emulsifiers

Emulsifiers or surfactants are also essential to the compositions of the present invention to aid in dispersion of solid particles (e.g., pigments). Without being limited by theory, emulsifiers help to render such solid particles hydrophobic and, hence, compatible with the silicone gel matrix of the present invention. These emulsifiers may be nonionic, anionic, amphoteric, zwitterionic or cationic. Suitable emulsifiers are disclosed in, for example, U.S. Patent 3,755,560, issued Aug. 28, 1973, Dickert et al.; U.S. Patent 4,421,769, issued Dec. 20, 1983, Dixon et al.; and McCutcheon's Detergents and Emulsifiers, North American Edition, pages 317-324 (1986), each incorporated herein by reference in its entirety. Illustrative nonionic surfactants are alkoxylated compounds based on C10-C22 fatty alcohols and acids, and sorbitan. These materials are available, for instance, from the Sbell Chemical Company under the Neodol trademark, Copolymers of polyoxypropylene-polyoxyethylene, sold by the BASF Corporation under the Pluronic trademark, are sometimes also useful. Alkyl polyglycosides available from the Henkel Corporation may also be utilized for purposes of this invention. Anionic type emulsifiers or surfactants include fatty acid soaps, sodium lauryl sulphate, sodium lauryl ether sulphate, alkyl benzene sulphonate, mono- and di-alkyl acid phosphates and sodium fatty acyl isethionate. Amphoteric emulsifiers or surfactants include such materials as dialkylamine oxide and various types of betaines (such as cocamidopropyl betaine).



Preferred for use herein are polyoxyalkylene copolymers also known as silicone polyethers. Polymers are described in detail in U. S. Patent 4,268,499, which is incorporated herein by reference in its entirety. A particularly preferred polyoxyalkylene copolymer is known by its CTFA designation as dimethicones copolyol. A particularly preferred form of  
5 dimethicone copolyol is that supplied by Dow Corning as DC5225C.

The overall concentration of the emulsifier can be from 0.1% to about 10% of the formulation, preferably from 0.1% to about 5% and most preferably from about 0.1% to about 2%, by weight of the composition. Examples of suitable emulsifiers can be found in U.S. Patent 5,085,856 to Dunphy et al.; Japanese Patent Publication Sho 61-83110; European Patent  
10 Application EP 522624 to Dunphy et al.; U.S. patent 5,688,831 to El-Nokaly et al.; and Examples of suitable moistures can be found in Cosmetic Bench Reference, pp. 1.22, 1.24-1.26 (1996), all of which are herein incorporated by reference in their entirety.

#### Pigments

The cosmetics of the present invention also contain pigment particles. As used herein,  
15 the term "pigment" means a solid that reflects light of certain wavelengths while absorbing light of other wavelengths, without providing appreciable luminescence. Useful pigments include, but are not limited, to those which are extended onto inert mineral(s) (e.g., talk, calcium carbonate, clay) or treated with silicone or other coatings (e.g., to prevent pigment particles from re-agglomerating or to change the polarity (hydrophobicity) of the pigment.

20 Pigments are used to impart opacity and color to the cosmetic compositions herein. Any pigment that is generally recognized as safe (such as those listed in C.T.F.A. cosmetic Ingredient Handbook, 3<sup>rd</sup> Ed., cosmetic and Fragrance Association, Inc., Washington, D.C. (1982), herein incorporated by reference) can be employed in the compositions herein. Useful pigments include body pigment, inorganic white pigment, inorganic colored pigment, pearling agent, and  
25 the like. Specific examples are talc, mica, magnesium carbonate, calcium carbonate, magnesium silicate, aluminum magnesium silicate, silica, titanium dioxide, zinc oxide, red iron oxide, yellow iron oxide, black iron oxide, ultramarine, polyethylene powder, methacrylate powder, polystyrene powder, silk powder, crystalline cellulose, starch, titanated mica, iron oxide titanated mica, bismuth oxychloride, and the like. These pigments and powders can be used  
30 independently or in combination. Titanium dioxide, iron oxides and mixtures thereof are especially preferred pigments for use herein.

Additional pigment/powder fillers include, but are not limited to, inorganic powders such as gums, chalk, Fuller's earth, kaolin, sericite, muscovite, phlogopite, synthetic mica,

lepidolite, biotite, lithia mica, vermiculite, aluminum silicate, starch, smectite clays, alkyl and/or trialkyl aryl ammonium smectites, chemically modified magnesium aluminum silicate, organically modified montmorillonite clay, hydrated aluminum silicate, fumed aluminum starch octenyl succinate barium silicate, calcium silicate, magnesium silicate, strontium silicate, metal tungstate, magnesium, silica alumina, zeolite, barium sulfate, calcined calcium sulfate (calcined gypsum), calcium phosphate, fluorine apatite, hydroxyapatite, ceramic powder, metallic soap (zinc stearate, magnesium stearate, zinc myristate, calcium palmitate, and aluminum stearate), colloidal silicone dioxide, and boron nitride; organic powder such as polyamide resin powder (nylon powder), cyclodextrin, methyl polymethacrylate powder, copolymer powder of styrene and acrylic acid, benzoguanamine resin powder, poly(ethylene tetrafluoride) powder, and carboxyvinyl polymer, cellulose powder such as hydroxyethyl cellulose and sodium carboxymethyl cellulose, ethylene glycol monostearate; inorganic white pigments such as magnesium oxide. Other useful powders are disclosed in U.S. Patent 5, 688,831, to El-Nokaly et al., issued November 18, 1997, herein incorporated by reference in its entirety. These pigments and powders can be used independently or in combination.

Also useful herein are pigment and/or dye encapsulates such nanocolorants from BASF and multi-layer interference pigments such as Sicopearls from BASF.

It is preferred that the pigments/powders are surface treated to provide added stability of color and ease of formulation. Hydrophobically treated pigments are more preferred, because they may be more easily dispersed in the solvent/oil phase. In addition, it may be useful to treat the pigments with a material that is compatible with a silicone phase. Particularly useful hydrophobic pigment treatments for use in water-in-silicone emulsions include polysiloxane treatments such as those disclosed in U.S. Patent 5,143,722, incorporated herein by reference in its entirety. Also preferred are pigment/powders having a primary average particle size of from about 5 nm to about 100,000 nm, more preferably from about 50nm to about 5,000nm, most preferably from about 100nm to about 1000nm. Mixtures of the same or different pigment/powder having different particle sizes are also useful herein (e.g., incorporating a TiO<sub>2</sub> having a primary particle size of from about 100 nm to about 400 nm with a TiO<sub>2</sub> having a primary particle size of from about 10 nm to about 50 nm).

Dispersants may also be used in conjunction with the colors and pigments of the present invention. Examples of suitable dispersants include, but are not limited to, those described in U.S. Patent 5,688,493, herein incorporated by reference in its entirety.

Preferably, the pigments are embedded in the film such that substantially no pigment resides on or protrudes through the surface of the film. By "substantially no pigment", as used herein means less than 30%, more preferably less than 20%, most preferably less than 10%, optimally less than 5% pigment resides on or protrudes through the surface of the film.

5       The present invention contains from about 0.1% to about 30%, preferably from about 1% to about 20%, more preferably from about 2% to about 15% and most preferably from about 5% to about 15%, by weight, of the pigment.

#### OPTIONAL INGREDIENTS

##### Shine Control Agents

10       Cosmetic products that improve and/or regulate the condition of the shiny appearance of skin are increasingly popular with consumers and are referred to herein as "shine control agents". Shine control agents may be included in the compositions of the present invention.

A frequent, undesirable condition is "oily skin", which results from the excessive amount of sebum and sweat that is excreted onto the skin. Sebum is an oily mixture, composed  
15       principally of squalene, triglycerides, fatty acids and wax esters. Sebum is produced in the sebaceous glands of the skin. Oily skin is associated with a shiny, undesirable appearance and disagreeable tactile sensation. Sweat is predominantly water with trace quantities of dissolved inorganic salts such as Sodium Chloride and Potassium Chloride.

Typically, shine control agents are porous in nature. These agents, when applied to the  
20       skin provide a reservoir to absorb excess moisture into the pores, hence reducing the visible quantity of moisture on the skin.

Without being limited by theory, it is believed that it is preferable to combine the use of effective porous, absorbent materials with non-absorbing spherical materials. The latter emphasizes the effect of diffuse reflection over problematic specular reflection, causing an  
25       optical modification to the skin and hence a reduction in the shiny appearance of the skin. The combination of shine control agents and non-absorbing spherical particles is preferable because it allows development of a product with optimum shine control as well as providing a product with the best tactile sensory performance.

Suitable shine control agents include, but are not limited to, silicas, magnesium  
30       aluminum silicates, talc, sericite and various organic copolymers. Particularly effective shine control agents include silicates or carbonates that are formed by reaction of a carbonate or silicate with the alkali (IA) metals, alkaline earth (IIA) metals, or transition metals, and silicas (silicon dioxide). Preferred shine control agents are selected from the group consisting of calcium

silicates, amorphous silicas, calcium carbonates, magnesium carbonates, zinc carbonates, and combinations thereof. Some specific examples of the silicates and carbonates useful in this present invention are more fully explained in Van Nostrand Reinhold's Encyclopedia of Chemistry, 4<sup>th</sup> Ed. pp155, 169, 556, and 849 (1984).

5           Synthetic versions of the shine control agents, particularly silicates, are preferred. Suitable synthetic carbonates are commercially available from Mallinckrodt or Whittaker, Clarke & Daniels. Examples of synthetic silicates useful in the present invention are Hubersorb 250® or Hubersorb 600®, available from JM Huber.

          Shine control agents that primarily comprise silicas are preferred over those materials  
10   comprising mainly silicates and/ or carbonates when used for moisture and shine control. Most preferred silicas are in the form of microspheres and/ or ellipsoids, as they have been found to contribute good skin feel characteristics in addition to efficient moisture absorption. Silica ellipsoids useful in the present invention are available from DuPont as ZELEC Sil and Kobo as Silica Shells. Silica microspheres are available from Kobo as MSS-500, MSS500/3, MSS-500H,  
15   MSS500/3N, MSS-500N and MSS 500/ 3N; Presperse as Spheron L1500, Spheron P1500. Fumed versions of silica can also be used with Aerosil from Degussa and Cab-O-Sil from Cabot both being particularly useful.

          Amongst the silicate series, magnesium aluminum silicates are useful, in particular Sebumase, available from Miyoshi Kasei.

20           When silicas, particularly silica ellipsoids and silica microspheres are intended to be the main means for moisture absorption, it is preferred that the absorbent powder comprise from about 1% to about 40%; more preferably from about 1% to about 25%, and most preferably from about 2% to about 10%, by weight of the composition, of silicas.

          Starch-based materials may also be used as shine control agents. Useful examples are  
25   Natosorb W and Natosorb HFW, DryFlo plus and DryFlo AP pure from National Starch and Chemical Company.

          Also found to be useful are methacrylate-based polymeric materials. They can be used either in conjunction with a dimethicone copolymer or as methacrylate-based copolymers. Specifically, useful examples are: Microsponge 5640 w. Glycerin, Polytrap 6603 available from  
30   Enhanced Derm technologies; DSPCS-I2 series and SPCAT-I2 from Kobo; Poly-Pore 200 series from Amcol.

          Optionally, yet preferably, the compositions of the present invention contain spherical particles having an average particle size diameter of 10 or greater, preferably greater than 15,

more preferably greater than 20 microns. The particle diameter is understood to be that of elementary or primary particles.

Preferred spherical particles include, but are not limited, to polymeric particles chosen from the methylsilsesquioxane resin microspheres such as for example those sold by Toshiba  
5 silicone under the name Tospearl 145A; microspheres of polymethylmethacrylates such as those sold by Seppic under the name Micropearl M 100; the spherical particles of crosslinked polydimethylsiloxanes, especially such as those sold by Dow Corning Toray Silicone under the name Trefil E 506C or Trefil E 505C, sphericle particles of polyamide and more specifically Nylon 12, especially such as those sold by Atochem under the name Orgasol 2002D Nat C05,  
10 polystyrene microspheres such as for example those sold by Dyno Particles under the name Dynospheres, ethylene acrylate copolymer sold by Kobo under the name FloBead EA209 and mixtures thereof. Also found to be useful is Ronasphere LDP from Kobo Inc.

Preferably the spherical particles are present at a concentration of from about 0% to about 40%, more preferably from about 5% to about 35%, most preferably from about 8% to  
15 about 30%.

#### Film Forming Agents

Film forming agents may be optionally included in the compositions of the present invention to aid film substantivity and adhesion to the skin. Improving the long wear and non-transfer performance of the present compositions is quite desirable. Water-soluble, water  
20 insoluble, and water dispersible film forming agents can be used in the internal and external phases of the present compositions to give the desired end benefit.

Preferably, the compositions comprise from about 0% to about 20%, more preferably, from about 0.1% to about 10%, and most preferably, from about 0.1% to about 5%, by weight of the composition, of the film-forming agent.

25 Suitable film forming agents include:

- 1) organic silicone resins, fluorinated silicone resins, copolymers of organic silicone resins, e.g., trimethylsiloxysilicate from GE (SR1000), GE's copolymers of silicone resins, e.g., SF1318 (silicone resin and an organic ester of isostearic acid copolymer) and CF1301 (silicone resin and alpha methyl  
30 styrene copolymer), Dow Corning's pressure sensitive adhesives - copolymers of silicone resins and various PDMS's (BIO-PSA series); and
- 2) acrylic and methacrylic polymers and resins, silicone-acrylate type copolymers and fluorinated versions of, including - silicones plus polymer

- SA70 from 3M, KP545 from Shin-Etsu, alkyl-acrylate copolymers, e.g., KP 561 and 562 from Shin-Etsu;
- 3) decene/butene copolymer from Collaborative Labs;
  - 4) polyvinyl based materials, e.g., PVP, PVP/VA, including Antaron/Ganex from ISP (PVP/Triacontene copolymer), Luviskol materials from BASF;
  - 5) polyurethanes, e.g., the Polyderm series from Alzo including but not limited to Polyderm PE/PA, Polyderm PPI-SI-WS, Polyderm PPI-GH, Luviset P.U.R. from BASF;
  - 6) polyquaternium materials, e.g., Luviquat series from BASF
  - 7) acrylates copolymers and acrylates/acrylamide copolymers, e.g., Luvimer and Ultrahold series, both available from BASF;
  - 8) styrene based materials; and
  - 9) chitosan and chitosan based materials including cellulose and cellulose-based materials.

Such film formers are disclosed for example in the International Cosmetic Ingredient Dictionary and Handbook, Seventh Edition, Vol 2, 1636-1638.

#### Skin Conditioning Agent

Optionally, the compositions of the present invention can further comprise a skin-conditioning agent. These agents may be selected from exfoliants, emollients or mixtures thereof.

Exfoliants according to the present invention may be selected from C2-C30 alpha-hydroxycarboxylic acids, beta-hydroxycarboxylic acids and salts of these acids. Most preferred are glycolic, lactic and salicylic acids and their ammonium salts. Amounts of the exfoliants may range from 1 to 15%, preferably from 2 to 10% by weight.

A wide variety of C2-C30 alpha-hydroxycarboxylic acids may be employed. Suitable examples of which include:

- alpha -hydroxyethanoic acid
- alpha -hydroxypropanoic acid
- alpha -hydroxyhexanoic acid
- alpha -hydroxyoctanoic acid
- alpha -hydroxydecanoic acid
- alpha -hydroxydodecanoic acid
- alpha -hydroxytetradecanoic acid

- alpha -hydroxyhexadecanoic acid
- alpha -hydroxyoctadecanoic acid
- alpha -hydroxyeicosanoic acid
- alpha -hydroxydocosanoic acid
- 5 alpha -hydroxyhexacosanoic acid, and
- alpha -hydroxyoctacosanoic acid

When the conditioning agent is an emollient it may be selected from hydrocarbons, fatty acids, fatty alcohols and esters. Isononyl isononanoate is the most preferred hydrocarbon type of emollient conditioning agent. Other hydrocarbons that may be employed include mineral oil, polyolefins such as polydecene, and paraffins such as isohexadecane (e.g. Permethyl 99 Registered TM and Permethyl 101 Registered TM). Preferably, the compositions of the present invention are substantially free of semi-solid hydrocarbons such as petrolatum, lanolin and lanolin derivatives, sterols (e.g., ethoxylated soya sterols), high molecular weight polyhutenes and cocoa butter. By "substantially free," as used herein, means that the concentration of the semi-solid hydrocarbons are preferably less than 10%, more preferably less than 5% most preferably less than 2% and even more preferably 0. Without being limited by theory, such semi-solid hydrocarbons tend to mask the sensory benefits of the siloxane elastomer compositions such as the non-greasy, light feel of the present invention.

Fatty acids and alcohols will have from 10 to 30 carbon atoms. Illustrative of this category are pelargonic, lauric, myristic, palmitic, stearic, isostearic, hydroxystearic, oleic, linoleic, ricinoleic, arachidic, hehenic and erucic acids and alcohols.

Oily ester emollients may be those selected from one or more of the following classes:

- 1, Triglyceride esters such as vegetable and animal fats and oils. Examples include castor oil, safflower oil, cottonseed oil, corn oil, olive oil, cod liver oil, almond oil, avocado oil, palm oil, sesame oil, squalene, Kikui oil and soybean oil.
2. Acetoglyceride esters, such as acetylated monoglycerides.
3. Ethoxylated glycerides, such as ethoxylated glyceryl monostearate.
4. Alkyl esters of fatty acids having 10 to 20 carbon atoms. Methyl, isopropyl, and butyl esters of fatty acids are useful herein. Examples include hexyl laurate, isohexyl laurate, isohexyl palmitate, isopropyl palmitate, decyl oleate, isodecyl oleate, hexadecyl stearate, decyl stearate, isopropyl isostearate, diisopropyl adipate, diisohexyl adipate, dihexyldecyl adipate, diisopropyl sebacate, lauryl lactate, myristyl lactate, and cetyl lactate.

5. Alkenyl esters of fatty acids having 10 to 20 carbon atoms. Examples thereof include oleyl myristate, oleyl stearate, and oleyl oleate.

6. Ether-esters such as fatty acid esters of ethoxylated fatty alcohols.

7. Polyhydric alcohol esters. Ethylene glycol mono and di-fatty acid esters, diethylene glycol mono- and di-fatty acid esters, polyethylene glycol (200-6000) mono- and di-fatty acid esters, propylene glycol mono- and di-fatty acid esters, polypropylene glycol 2000 monooleate, polypropylene glycol 2000 monostearate, ethoxylated propylene glycol monostearate, glyceryl mono- and di-fatty acid esters, polyglycerol polyfatty esters, ethoxylated glyceryl monostearate, 1,2-butylene glycol monostearate, 1,2-butylene glycol distearate, polyoxyethylene polyol fatty acid ester, sorbitan fatty acid esters, and polyoxyethylene sorbitan fatty acid esters are satisfactory polyhydric alcohol esters.

8. Wax esters such as beeswax, spermaceti, myristyl myristate, stearyl stearate.

9. C1-C30 mono- and poly- esters of sugars and related materials. These esters are derived from a sugar or polyol moiety and one or more carboxylic acid moieties. Depending on the constituent acid and sugar, these esters can be in either liquid or solid form at room temperature. Examples of liquid esters include: glucose tetraoleate, the glucose tetraesters of soybean oil fatty acids (unsaturated), the mannose tetraesters of mixed soybean oil fatty acids, the galactose tetraesters of oleic acid, the arabinose tetraesters of linoleic acid, xylose tetralinoleate, galactose pentaoleate, sorbitol tetraoleate, the sorbitol hexaesters of unsaturated soybean oil fatty acids, xylitol pentaoleate, sucrose tetraoleate, sucrose pentaoleate, sucrose hexaoleate, sucrose hepatoleate, sucrose octaoleate, and mixtures thereof. Examples of solid esters include: sorbitol hexaester in which the carboxylic acid ester moieties are palmitoleate and arachidate in a 1:2 molar ratio; the octaester of raffinose in which the carboxylic acid ester moieties are linoleate and behenate in a 1:3 molar ratio; the heptaester of maltose wherein the esterifying carboxylic acid moieties are sunflower seed oil fatty acids and lignocerate in a 3:4 molar ratio; the octaester of sucrose wherein the esterifying carboxylic acid moieties are oleate and behenate in a 1:3 molar ratio; and the octaester of sucrose wherein the esterifying carboxylic acid moieties are laurate, linoleate and behenate in a 1:3:4 molar ratio. A preferred solid material is sucrose polyester in which the degree of esterification is 7-8, and in which the fatty acid moieties are C18 mono- and/or di-unsaturated and behenic, in a molar ratio of unsaturates: behenic of 1:7 to 3:5. A particularly preferred solid sugar polyester is the octaester of sucrose in which there are about 7 behenic fatty acid moieties and about 1 oleic acid moiety in the molecule. Other materials include cottonseed oil or soybean oil fatty acid esters of sucrose. The



ester materials are further described in, U.S. Patent 2,831,854, U.S. Patent 4,005,196, to Jandacek, issued Jan. 25, 1977; U.S. Patent 4,005,195, to Jandacek, issued Jan. 25, 1977, U.S. Patent 5,306,516, to Letton et al., issued Apr. 26, 1994; U.S. Patent 5,306,515, to Letton et al., issued Apr. 26, 1994; U.S. Patent 5,305,514, to Letton et al., issued Apr. 26, 1994; U.S. Patent 5,479,300, to Jandacek et al., issued Jan. 10, 1989; U.S. Patent 3,963,699, to Rizzi et al, issued Jun. 15, 1976; U.S. Patent 4,518,772, to Volpenhein, issued May 21, 1985; and U.S. Patent 4,517,360, to Volpenhein, issued May 21, 1985.

Amounts of the skin-conditioning agent may range from about 0% to 30%, preferably from about 1% to about 20%, optimally from about 1% to 10% by weight.

#### 10 Solidifying Agent

The cosmetic compositions of this invention can contain one or more materials, herein singly or collectively referred to as a "solidifying agent", that are effective to solidify the particular liquid base materials to be used in a cosmetic composition. (As used herein, the term "solidify" refers to the physical and/or chemical alteration of the liquid base material so as to form a solid or semi-solid at ambient conditions, i.e., to form a final composition that has a stable physical structure and is deposited on the skin during normal use conditions.) As is appreciated by those skilled in the art, the selection of the particular solidifying agent for use in the cosmetic compositions will depend upon the particular type of composition desired, i.e., gel or wax-based, the desired rheology, the liquid base material used and the other materials to be used in the composition. The solidifying agent is preferably present at a concentration of from about 0 to about 90%, more preferably from about 1 to about 50%, even more preferably from about 5% to about 40%, most preferably from about 1% to about 15%.

Suitable solidifying agents include waxy materials such as candelilla, carnauba waxes, beeswax, spermaceti, carnauba, baysberry, montan, ozokerite, ceresin, paraffin, synthetic waxes such as Fisher-Tropsch waxes, silicone waxes (e.g., DC 2503 from Dow Corning), microcrystalline waxes and the like; soaps, such as the sodium and potassium salts of higher fatty acids, i.e., acids having from 12 to 22 carbon atoms; amides of higher fatty acids; higher fatty acid amides of alkylolamines; dibenzaldehyde-monosorbitol acetals; alkali metal and alkaline earth metal salts of the acetates, propionates and lactates; and mixtures thereof. Also useful are polymeric materials such as, locust bean gum, sodium alginate, sodium caseinate, egg albumin, gelatin agar, carrageenin gum sodium alginate, xanthan gum, quince seed extract, tragacanth gum, starch, chemically modified starches and the like, semi-synthetic polymeric materials such as cellulose ethers (e.g. hydroxyethyl cellulose, methyl cellulose, hydroxypropyl cellulose,

carboxymethyl cellulose, hydroxy propylmethyl cellulose), polyvinylpyrrolidone, polyvinylalcohol, guar gum, hydroxypropyl guar gum, soluble starch, cationic celluloses, cationic guar and the like and synthetic polymeric materials such as carboxyvinyl polymers, polyvinylpyrrolidone, polyvinyl alcohol polyacrylic acid polymers, polymethacrylic acid polymers, polyvinyl acetate polymers, polyvinyl chloride polymers, polyvinylidene chloride polymers and the like. Inorganic thickeners may also be used such as aluminum silicates, such as, for example, bentonites, or a mixture of polyethylene glycol and polyethylene glycol stearate or distearate. Naturally occurring polymers or biopolymers and their use are further described in European Application No. 522624, to Dunphy et al. Additional examples of naturally occurring polymers or biopolymers can be found in the Cosmetic Bench Reference, pp. 1.40-1.42, herein incorporated by reference.

Hydrophobically modified celluloses are also suitable for use herein. These celluloses are described in detail in U.S. Patents 4,228,277 and 5,104,646, both of which are herein incorporated by reference in their entirety.

Additional examples of suitable gelling agents or gellants can be found in the Cosmetic Bench Reference, p. 1.27, herein incorporated by reference. Other gelling agents suitable for use herein include oleogels such as trihydroxystearin.

Further examples of suitable solidifying agents disclosed in the following references, all of which are incorporated by reference herein: U.S. Patent 4,151,272, Geary, et al., issued Apr. 24, 1979; U.S. Patent 4,229,432, Geria, issued Oct. 21, 1980; and U.S. Patent 4,280,994, Turney, issued July 28, 1981; "The Chemistry and Technology of Waxes", A. H. Warth, 2nd Edition, reprinted in 1960, Reinhold Publishing Corporation, pp 391-393 and 421; "The Petroleum Chemicals Industry", R. F. Goldstein and A. L. Waddeam, 3rd Edition (1967), E & F. N. Span Ltd., pp 33-40; "The Chemistry and Manufacture of Cosmetics", M. G. DeNavarre, 2nd edition (1970), Van Nostrand & Company, pp 354-376; and in "Encyclopedia of Chemical Technology", Vol. 24, Kirk-Othmer, 3rd Edition (1979) pp 466-481; U.S. Patent 4,126,679, Davy, et al., issued Nov. 21, 1978; European Patent Specification No. 117,070, May, published Aug. 29, 1984; U.S. Patent 2,900,306, Slater, issued Aug. 18, 1959; U.S. Patent 3,255,082, Barton, issued June 7, 1966; U.S. Patent 4,137,306, Rubino, et al., issued Jan. 30, 1979; U.S. Patent 4,154,816, Roehl, et al., issued May 15, 1979; U.S. Patent 4,226,889, Yuhas, issued Oct. 7, 1980; U.S. Patent 4,346,079, Roehl, issued Aug. 24, 1982; U.S. Patent 4,383,988, Teng, et al., issued May 17, 1983; European Patent Specification No. 107,330, Luebbe, et al., published May 2, 1984;

European Patent Specification No. 24,365 Sampson, et al., published Mar. 4, 1981; and U.S. patent application Ser. No. 630,790, DiPietro, filed July 13, 1984.

Preferably, the compositions of the present invention have a hardness value as measured using a TA-XT2i Texture Analyzer (described below) of up to about 25 gram-force, more preferably from about 0.5 to about 20 gram-force, most preferably from about 1 to about 15, optimally from about 1 to about 10 gram-force. Without being limited by theory, it is believed that compositions having stick hardness values above 25 gram-force tend to interfere with the formation of the film structure provided by the polysiloxane elastomer, thus, preventing the smoothness as well as improved uniformity and evenness of particle distribution within the film. This, in turn, negatively affects the sensory benefits of the cross-linked polysiloxane elastomer component.

Preferably the compositions of the present invention are substantially free of hydrophilic or water soluble gelling agents such as the acrylic acid/ethyl acrylate copolymers and the carboxyvinyl polymers sold by the B.F. Goodrich Company under the trademark of Carbopol Registered TM resins. By "substantially free," as used herein, means that the concentration of hydrophilic or water soluble gelling agents is preferably less than 10%, more preferably less than 5% most preferably less than 2% and even more preferably 0. These resins consist essentially of a colloiddally water-soluble polyalkenyl polyether crosslinked polymer of acrylic acid crosslinked with from 0.75% to 2.00% of a crosslinking agent such as polyallyl sucrose or polyallyl pentaerythritol. Examples include Carbopol 934, Carbopol 940, Carbopol 950, Carbopol 980, Carbopol 951 and Carbopol 981, Carbopol 934, Carbopol Ultrez 10, Carbopol ETD2020, Carbopol 1382, Carbopol 1342 and Pemulen TR-1.

#### Colorant

Certain embodiments of the present invention contain from about 0% to about 30%, preferably from about 1% to about 20%, more preferably from about 2% to about 15% and most preferably from about 5% to about 15%, of a non-pigment colorant, on an anhydrous weight basis. These are usually aluminum, barium or calcium salts or lakes. Preferably, dyes are present at from about 0% to about 3% and pearls and the like from 0% to about 10%.

Colorants useful herein are all inorganic and organic colors suitable for use in cosmetic compositions.

Lakes are either a pigment that is extended or reduced with a solid diluent or an organic pigment that is prepared by the precipitation of a water-soluble dye on an adsorptive surface, which usually is aluminum hydrate. There is uncertainty in some instances as to whether the

soluble dye precipitates on the surface of the aluminum hydrate to yield a dyed inorganic pigment or whether it merely precipitates in the presence of the substrate. A lake also forms from precipitation of an insoluble salt from an acid or basic dye. Calcium and barium lakes are also used herein.

5 Lakes suitable for use in the present invention include Red 3 Aluminum Lake, Red 21 Aluminum Lake, Red 27 Aluminum Lake, Red 28 Aluminum Lake, Red 33 Aluminum Lake, Yellow 5 Aluminum Lake, Yellow 6 Aluminum Lake, Yellow 10 Aluminum Lake, Orange 5 Aluminum Lake and Blue 1 Aluminum Lake, Red 6 Barium Lake, Red 7 Calcium Lake.

Other colors can also be included herein, such as dyes. Suitable examples include Red 6,  
10 Red 21, Brown, Russet and Sienna dyes and mixtures thereof.

#### Preservatives

Suitable traditional preservatives for compositions of this invention are alkyl esters of para-hydroxybenzoic acid. Other preservatives that have more recently come into use include hydantoin derivatives such as 1,3-bis (hydroxymethyl)-5,5-dimethylhydantoin, propionate salts,  
15 and a variety of quaternary ammonium compounds such as benzalkonium chloride, quaternium 15 (Dowicil 200), benzethonium Chloride, and methylbenzethonium chloride. Cosmetic chemists are familiar with appropriate preservatives and routinely choose them to satisfy the preservative challenge test and to provide product stability. Particularly preferred preservatives are disodium EDTA, phenoxyethanol, methyl paraben, propyl paraben, imidazolidinyl urea (commercially  
20 available as Germall 1157), sodium dehydroacetate and benzyl alcohol. The preservatives should be selected having regard for the use of the composition and possible incompatibilities between the preservatives and other ingredients in the emulsion. Preservatives preferably are employed in amounts ranging from about 0% to about 5%, more preferably from about 0.01% to about 2.5%, and most preferably from about 0.01% to about 1%, by weight of the composition.

#### 25 Essentially Anhydrous

Cosmetic compositions of the present invention are essentially anhydrous. The amount of water will be confined to range from 0 to 5%, preferably not above 4%, more preferably not above 2%, optimally not above 0.5%, most preferably 0% by weight.

#### Organic Sunscreens

30 Compositions of the present invention preferably comprise an organic sunscreen. Suitable sunscreens can have UVA absorbing properties, UVB absorbing properties or a mixture thereof. The exact amount of the sunscreen active will vary depending upon the desired Sun Protection Factor, i.e. the "SPF" of the composition as well as the desired level of UVA

protection. The compositions of the present invention preferably comprise an SPF of at least 10, preferably at least 15. (SPF is a commonly used measure of photoprotection of a sunscreen against erythema. The SPF is defined as a ratio of the ultraviolet energy required to produce minimal erythema on protected skin to that required to produce the same minimal erythema on unprotected skin in the same individual. See Federal Register, 43, No 166, pp. 38206-38269, August 25, 1978). Compositions of the present invention preferably comprise from about 2% to about 20%, more typically from about 4% to about 14%, by weight, of organic sunscreen. Suitable sunscreens include, but are not limited to, those found in the *CTFA International Cosmetic Ingredient Dictionary and Handbook*, 7<sup>th</sup> edition, volume 2 pp. 1672, edited by Wenninger and McEwen (The Cosmetic, Toiletry, and Fragrance Association, Inc., Washington, D. C., 1997).

The compositions of the present invention preferably comprise a UVA absorbing sunscreen actives that absorb UV radiation having a wavelength of from about 320nm to about 400nm. Suitable UVA absorbing sunscreen actives are selected from dibenzoylmethane derivatives, anthranilate derivatives such as methylantranilate and homomethyl, 1-N-acetylantranilate, and mixtures thereof. Examples of dibenzoylmethane sunscreen actives are described in US Patent No 4,387,089 issued to Depolo; and in *Sunscreens: Development, Evaluation, and Regulatory Aspects* edited by N. J. Lowe and N. A. Shaath, Marcel Dekker, Inc (1990). The UVA absorbing sunscreen active is preferably present in an amount to provide broad-spectrum UVA protection either independently, or in combination with, other UV protective actives that may be present in the composition.

Preferred UVA sunscreen actives are dibenzoylmethane sunscreen actives and their derivatives. They include, but are not limited to, those selected from 2-methyldibenzoylmethane, 4-methyldibenzoylmethane, 4-isopropyldibenzoylmethane, 4-tert-butyl-dibenzoylmethane, 2, 4-dimethyldibenzoylmethane, 2, 5-dimethyldibenzoylmethane, 4, 4'-diisopropylbenzoylmethane, 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane, 2-methyl-5-isopropyl-4'-methoxydibenzoylmethane, 2-methyl-5-tert-butyl-4'-methoxydibenzoylmethane, 2, 4-dimethyl-4'-methoxydibenzoylmethane, 2, 6-dimethyl-4'-tert-butyl-4'-methoxydibenzoylmethane, and mixtures thereof. Preferred dibenzoyl sunscreen actives include those selected from 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane, 4-isopropyldibenzoylmethane, and mixtures thereof. A more preferred sunscreen active is 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane.

The sunscreen active 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane, which is also known as butyl methoxydibenzoylmethane or Avobenzone, is commercially available under the names of Parsol® 1789 from Givaudan Roure (International) S. A. (Basel, Switzerland) and Eusolex® 9020 from Merck & Co., Inc (Whitehouse Station, NJ). The sunscreen 4-  
5 isopropylidibenzoylmethane, which is also known as isopropylidibenzoylmethane, is commercially available from Merck under the name of Eusolex® 8020.

The compositions of the present invention preferably further comprise a UVB sunscreen active that absorbs UV radiation having a wavelength of from about 290nm to about 320nm. The compositions preferably comprise an amount of the UVB sunscreen active that is safe and  
10 effective to provide UVB protection either independently, or in combination with, other UV protective actives that may be present in the compositions. The compositions preferably comprise from about 0.1% to about 16%, more preferably from about 0.1% to about 12%, and most preferably from about 0.5% to about 8% by weight, of UVB absorbing organic sunscreen.

A wide variety of UVB sunscreen actives are suitable for use herein. Nonlimiting  
15 examples of such organic sunscreen actives are described in US Patent No 5,087,372 issued February 11, 1992 to Haffey et al.; and US Patent Nos 5,073,371 and 5,073,372 both issued on December 17, 1991 to Turner et al.. Preferred UVB sunscreen actives are selected from 2-ethylhexyl-2-cyano-3, 3-diphenylacrylate (referred to as octocrylene), 2-phenyl-benzimidazole-5-sulphonic acid (PBSA), cinnamates and their derivatives such as 2-ethylhexyl-p-methoxycinnamate and octyl-p-methoxycinnamate, TEA salicylate, octyldimethyl PABA,  
20 camphor derivatives and their derivatives, and mixtures thereof. Preferred organic sunscreen actives are 2-ethylhexyl-2-cyano-3, 3-diphenylacrylate (referred to as octocrylene), 2-phenyl-benzimidazole-5-sulphonic acid (PBSA), octyl-p-methoxycinnamate, and mixtures thereof. Salt and acid neutralised forms of the acidic sunscreens are also useful herein. When organic  
25 sunscreen salts, such as PBSA, are used within compositions of the present invention they can disrupt the action of the thickener with the result that the final product may have sub optimal rheology. This can be countered by the addition of higher levels of thickener, fatty alcohols or nonionic surfactants such that the rheology of the final product returns to the desired level.

An agent may also be added to any of the compositions useful in the present invention to  
30 stabilise the UVA sunscreen to prevent it from photo-degrading on exposure to UV radiation and thereby maintaining its UVA protection efficacy. Wide ranges of compounds have been cited as providing these stabilising properties and should be chosen to compliment both the UVA sunscreen and the composition as a whole. Suitable stabilising agents include, but are not limited

to, those described in US Patents Nos 5,972,316; 5,968,485; 5,935,556; 5,827,508 and Patent WO 00/06110. Preferred examples of stabilising agents for use in the present invention include 2-ethylhexyl-2-cyano-3, 3-diphenylacrylate (referred to as octocrylene), ethyl-2-cyano-3, 3-diphenylacrylate, 2-ethylhexyl-3, 3-diphenylacrylate, ethyl-3, 3-bis (4-methoxyphenyl) acrylate, and mixtures thereof. 2-ethylhexyl-2-cyano-3, 3-diphenylacrylate is most preferred.

An agent may also be added to any of the compositions useful in the present invention to improve the skin substantivity of those compositions, particularly to enhance their resistance to being washed off by water, or rubbed off. A preferred agent that will provide this benefit is a copolymer of ethylene and acrylic acid. Compositions comprising this copolymer are disclosed in U.S. Patent 4,663,157, Brock, issued May 5, 1987.

#### Inorganic Sunscreens

In addition to the organic sunscreens compositions of the present invention can additionally comprise inorganic physical sunblocks. Nonlimiting examples of suitable physical sunblocks are described in CTFA International Cosmetic Ingredient Dictionary, 6<sup>th</sup> Edition, 1995, pp. 1026-28 and 1103, Sayre, R. M. et al., "Physical Sunscreens", J. Soc. Cosmet. Chem., Vol 41, no 2, pp. 103-109 (1990). Preferred inorganic physical sunblocks are zinc oxide and titanium dioxide, and mixtures thereof.

When used, the physical sunblocks are present in an amount such that the present compositions are transparent on the skin (i.e. non-whitening), preferably less than or equal to about 5%. When titanium dioxide is used, it can have an anatase, rutile, or amorphous structure. Physical sunblock particles, e.g. titanium dioxide and zinc oxide, can be uncoated or coated with a variety of materials including but not limited to amino acids, aluminum compounds such as alumina, aluminum stearate, aluminum laurate, and the like; carboxylic acids and their salts e.g. stearic acid and its salts; phospholipids such as lecithin; organic silicone compounds; inorganic silicone compounds such as silica and silicates; and mixtures thereof. A preferred titanium dioxide is commercially available from Tayca (Japan) and is distributed by Tri-K Industries (Emerson, NJ) under the MT micro-ionized series (e.g. MT 100SAS).

The compositions of the present invention preferably comprise from about 0.1% to about 10%, more preferably from about 0.1% to about 4%, and most preferably from about 0.5% to about 2.5%, by weight, of inorganic sunscreen.

#### Aerated Compositions

Optionally and preferably, the compositions of the present invention are aerated. By "aerated" as used herein means the air is incorporated either by hand, mechanical mixing or by

using any other form of conventional foaming or whipping instrument technology. Preferably the compositions of the present invention contain at least about 1%, preferably at least about 2%, optimally from about 3 to about 5% air.

#### Other Optional Ingredients

5 A variety of additional ingredients can be incorporated into the compositions of the present invention. Nonlimiting examples of these additional ingredients include additional skin care actives such as peptides (e.g., Matrixyl [pentapeptide derivative]), farnesol, bisabolol, phytantriol, glycerol, urea, guanidine (e.g., amino guanidine); vitamins and derivatives thereof such as ascorbic acid, vitamin A (e.g., retinoid derivatives such as retinyl palmitate or retinyl  
10 propionate), vitamin E (e.g., tocopherol acetate), vitamin B<sub>3</sub> (e.g., niacinamide) and vitamin B<sub>5</sub> (e.g., panthenol) and the like and mixtures thereof; sunscreens; anti-acne medicaments (resorcinol, salicylic acid, and the like; antioxidants (e.g., phytosterols, lipoic acid); flavonoids (e.g., isoflavones, phytoestrogens); skin soothing and healing agents such as aloe vera extract, allantoin and the like; chelators and sequestrants; and agents suitable for aesthetic purposes such  
15 as essential oils, fragrances, skin sensates, opacifiers, aromatic compounds (e.g., clove oil, menthol, camphor, eucalyptus oil, and eugenol). Nonlimiting examples of suitable carboxylic copolymers, emulsifiers, emollients, and other additional ingredients are disclosed in U.S. Patent 5,011,681, to Ciotti et al., issued April 30, 1991 and US Patent 5,939,082, to Oblong et al., issued August 17, 1999, both of which are herein incorporated by reference. The above-  
20 mentioned vitamin B<sub>3</sub> compounds can be incorporated as re-crystallized crystals that remain in crystalized form in the composition or as partially solubilize crystals (i.e., some of the crystals are dissolved and some remain in crystalline form in the composition.).

#### Analytical Test Methods

##### Determination of Particle Size

25 Samples are prepared placing approximately 1 gram of the cross-linked elastomer (gel) in a small bottle with approximately 30 grams of a 1:1 isopropyl alcohol: dimethicone (DC 245) solution (IPA: DC245). The 1:1 IPA: DC245 solution is passed through a 0.2 µm syringe filter to remove foreign particulates (e.g., dust). The sample is then mixed (to disperse elastomer) using a Glass-Col Tissue Culture Rotator set at 70% for approximately 5 days.

30 The samples were, next, measured using a Horiba LA-910 equipped with a fraction cell holder and a magnetic stir bar. For a blank, a separate sample was prepared containing only the 30 grams 1:1 IPA: DC245. Before measurement, 10ml aliquots of the prepared samples were placed in a small vial and allowed to settle for 30 minutes (to separate out large agglomerates).



Stirring was used during measurement and the sampling time was set at 25 sec., the data were reported on a Volume basis using a relative refractive index of 1.06-0.00i. Samples are further diluted with 1:1 IPA: DC245 as necessary to achieve concentrations within the working range for the Horiba LA-910. More detailed instructions can be found in the Operator's Manual for the  
5 Horiba LA 910, herein incorporated by reference. The process is additionally described in US Patent 5,998,542 and US Patent 5,929,162, both of which are herein incorporated by reference in their entirety

#### Hardness Value Test

The term "product hardness" as used herein is a reflection of how much force is required  
10 to move a rod a specified distance and at a controlled rate into a cosmetic composition under the following test conditions. Higher values represent harder product, and lower values represent softer product. These values are measured at 27°C, 15% relative humidity, using a TA-XT2i Texture Analyzer, available from Texture Technology Corp., Scarsdale, New York, U.S.A. The product hardness value as used herein represents the amount of force required to move a 16mm  
15 long stainless steel rod having a 0.254mm diameter through the composition for a distance of 12.2mm at a rate of 0.85mm/second. The rod is attached to the instrument by means of a suitable adapter (e.g., drill-type chuck). Other test parameters include: Pre-Test Speed of 0.85 mm/s, Post Test Speed of 1.70 mm/s, trigger distance of 0.1mm. More detailed instructions can be found in the Operator's Manual for the TA-XT2i, herein incorporated by reference.

#### ASSOCIATED METHODS

Applicants have found that the compositions of the present invention are useful in a variety of applications directed to enhancement of mammalian skin. The methods of use for the compositions disclosed and claimed herein include, but are not limited to: 1) methods of increasing the substantivity of a cosmetic to skin; 2) methods of moisturizing skin; 3) methods of  
25 improving the natural appearance of skin; 4) methods of applying a color cosmetic to skin; 5) methods of preventing, retarding, and/or treating wrinkles; 6) methods of providing UV protection to skin; 7) methods of preventing, retarding, and/or controlling the appearance of oil; 8) methods of modifying the feel and texture of skin; 9) methods of providing even skin tone; 10) methods of preventing, retarding, and/or treating the appear of spider vessels and varicose veins;  
30 11) methods of masking the appearance of vellus hair on skin; and 12) methods of concealing blemishes and/or imperfections in human skin, including acne, age spots, freckles, moles, scars, under eye circles, birth marks, post-inflammatory hyperpigmentation, etc.. Each of the methods discussed herein involve topical application of the claimed compositions to skin.

The following examples will more fully illustrate the embodiments of this invention. All parts, percentages and proportions referred to herein and in the appended claims are by weight unless otherwise indicated.

### EXAMPLES

5        The cosmetic products in the following examples illustrate specific embodiments of the cosmetic compositions of the present invention, but are not intended to be limiting thereof. The skilled artisan can undertake other modifications without departing from the spirit and scope of this invention. All exemplified compositions can be prepared by conventional formulation and mixing techniques. Component amounts are listed as weight percents and may exclude minor  
10       materials such as diluents, filler, and so forth. The listed formulations, therefore, comprise the listed components and any minor materials associated with such components.

#### Example I

A foundation compact of the present invention comprising cross-linked siloxane elastomer is prepared as follows:

15

<u>Ingredient</u>	<u>Wt %</u>
TiO <sub>2</sub> silicone treated (SAT treated Tronox CR 837 supplied US Cosmetics)	5.25
Pigment	1.23
Talc (silicone treated) (Hydrophobic Talc 9742 supplied by Warner Jenkinson)	2.36
TiO <sub>2</sub> -MT100T (micronized TiO <sub>2</sub> supplied by Tri-K)	0.16
DC245 (cyclomethicone)	29.26
DC5225C (dimethicone copolyol - 10% active in cyclomethicone)	0.31
GE SFE 839 Cross-linked Siloxane Elastomer Gel <sup>1</sup>	48
propylparaben (preservative)	0.10
Glycerine	7.08
Ozokerite Wax	6.25
Total:	100.00

<sup>1</sup> 5%Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone

In a suitable vessel equipped with a heating source, the pigments, TiO<sub>2</sub> (micronized and silicone treated), hydrophobic talc, GE SFE 839, cyclomethicone (DC245) and dimethicone copolyol (DC5225C) are mixed until homogeneous and then milled using a Silverson L4RT mixer at 9000 rpms to the desired particle size. Next, the propylparaben and glycerine are added to the above mixture and mixed until homogenous. The mixture is then heated to a temperature of between 85 - 90°C, at which time the ozokerite wax is added (melted into the mixture) with mixing until the mixture homogenous. The mixture is then poured into a mold and allowed to cool at room temperature. Once cooled, the mixture incorporated into the appropriate package.

The foundation compact is applied to the face to provide color, moisturization and improved feel.

#### Example II

A mousse foundation of the present invention comprising cross-linked siloxane elastomer is prepared as follows:

<u>Ingredient</u>	<u>Wt. %</u>
TiO <sub>2</sub> silicone treated (SAT treated Tronox CR 840 supplied US Cosmetics)	8.45
Pigment	2.00
Talc- Silicone Treated	3.84
TiO <sub>2</sub> -MT100T (micronized)	0.26
DC245 (cyclomethicone)	7.65
DC5225C (Dimethicone Copolyol)	0.50
GE SFE 839 Cross-linked Siloxane Elastomer Gel <sup>1</sup>	77.2
propylparaben (preservative)	0.10
<b>TOTAL:</b>	<b>100.00</b>

<sup>1</sup> 5% Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone

In a suitable vessel, the pigments, TiO<sub>2</sub> (micronized and silicone treated), hydrophobic talc, GE SFE 839, cyclomethicone (DC245) and dimethicone copolyol (DC5225C) are mixed until homogeneous and, then, milled using a Silverson L4RT mixer at 9000 rpms to the desired particle size. Next, the propylparaben are added to the above mixture and mixed until homogenous. The mixture is, then, incorporated into the appropriate package.

The foundation compact is applied to the face to provide color, moisturization and improved feel.

### Example III

A lip gel of the present invention comprising cross-linked siloxane elastomer is prepared  
5 as follows:

<u>Ingredient</u>	<u>Wt %</u>
GE SFE 839 Cross-linked Siloxane Elastomer Gel <sup>1</sup>	80.0
Abil WE-09 <sup>2</sup>	1.0
Cyclomethicone (DC245 fluid)	5.8
Dimethicone Fluid (DC200 fluid) 50 cst	4.5
Pigment	8.5
Preservative	0.2
<b>TOTAL:</b>	<b>100.0</b>

<sup>1</sup> 5% Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone

<sup>2</sup> Cetyl dimethicone copolyol

In a suitable vessel, the pigment and Abil WE-09 are added and milled to desired particle  
10 size using conventional milling technology. Next, the GE SFE 839, cyclomethicone, dimethicone fluid and preservative are added and the mixture is mixed until homogeneous using conventional mixing technology. The mixture is, then, incorporated into the appropriate package.

The lip gel is applied to the lips to provide color, moisturization and improved feel.

### Example IV

A lip balm of the present invention comprising cross-linked siloxane elastomer is  
15 prepared as follows:

<u>Ingredient</u>	<u>Wt%</u>
Stearyl Dimethicone (DC 2503 wax)	10.0
Glycerine	10.0
DC 9040 Cross-linked Siloxane Elastomer Gel <sup>1</sup>	26.15
Cyclomethicone (DC-245)	41.55
Dimethicone copolyol (DC-5225C)	5.0
Preservative	0.3

Ozokerite wax	7.0
TOTAL:	100.0

<sup>1</sup> 13% Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone

In a suitable vessel equipped with a heating source, the stearyl dimethicone, glycerine, GE SFE 839, cyclomethicone, dimethicone copolyol, and preservative are added and mixed using a Caframo RZR50 mixer at 100 to 300 rpms until homogeneous. The mixture is then heated to a temperature of between 85 - 90°C, at which time the ozokerite wax is added (melted into the mixture) with mixing until the mixture homogenous. The mixture is then poured into a mold and allowed to cool at room temperature. The mixture is cooled to ambient temperature and incorporated into the appropriate package.

The lip balm is applied to the lips to provide moisturization and improved feel.

#### Example V

A transfer resistant lipstick of the present invention comprising cross-linked siloxane elastomer is prepared as follows:

<u>Ingredient</u>	<u>Wt %</u>
GE SFE 839 Cross-linked Siloxane Elastomer gel <sup>1</sup>	35.7
Diisopropyl Dimerate	17.000
Synthetic Wax (6657 Type)	11.000
Isododecane	8.900
Silicone Fluid (244 Type)	6.500
Pearl, Pearl-Glo UVR	5.000
Paraffin Wax	5.000
Polyglyceryl-3 Diisostearate	3.000
Ozokerite (SP-1026 Type)	3.000
Titanium Dioxide 328	1.800
Mixed Tocopherols	0.200
Color	2.800
Propylparaben, NF	0.100

Total	100.000
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<sup>1</sup> 5% Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone

In a suitable vessel, the pigments and the diisopropyl dimerate are added with stirring until homogeneous. The mixture is then milled using conventional milling technology until a pigment slurry of desired pigment particle size is obtained.

In a separate vessel equipped with a heating source and a cover or lid for sealing the vessel, the pigment slurry, the synthetic wax (6657 Type), silicone fluid (244 Type), pearl, Pearl-Glo UVR, paraffin wax, polyglyceryl-3 diisostearate, ozokerite (SP-1026 Type), titanium dioxide 328, mixed tocopherols, color, and propylparaben is added and heated with mixing to a melt temperature of between 90 - 115°C. The vessel is sealed and the mixture is heated and mixed using conventional mixing technology until all waxes are melted and the mixture is homogenous. Next the elastomer gel and isododecane are added into the melted wax/oil/pigment mixture with mixing. The vessel is then re-sealed and heated to return the mixture to the full melt temperature. Once melt temperature is reached the mixture is mixed until homogenous. The mixture is then poured into a mold and allowed to cool at room temperature. Once cooled, the mixture incorporated into the appropriate package.

The transfer resistant lipstick is applied to the lips to provide color, moisturization and improved skin feel.

#### Example VI

An eyeliner of the present invention comprising cross-linked siloxane elastomer is prepared as follows:

<u>Ingredient</u>	<u>Wt %</u>
GE SFE 839 Cross-linked Siloxane Elastomer gel <sup>1</sup>	42.60
Abil WE-09	1.0
Paraffin	17.10
PEG-6 Beeswax	7.70
Diisostearyl Dimer Dilinoleate	5.60
MICA	5.20

Hydrogenated Caster Oil	4.30
Pigments	11.95
Ozokerite	3.40
Ceresin	0.84
Propylparaben	0.12
Methylparaben	0.12
BHT	0.05
Total	100.00

<sup>1</sup> 5% Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone

In a suitable vessel equipped with a heat source and a cover or lid for sealing the vessel, the paraffin, PEG-6 beeswax, diisostearyl dimer dilinoleate, hydrogenated caster oil, ozokerite, ceresin, propylparaben, methylparaben, and BHT are added and heated with mixing to a melt temperature of between 85-90°C. The vessel is sealed and the mixture is heated and mixed using conventional mixing technology until all waxes are melted and the mixture is homogenous. While maintaining the temperature, the pigments and Abil WE-09 are added with mixing until homogenous. The mixture is then milled using conventional milling technology until a pigment slurry (or oil/pigment mixture) of desired pigment particle size is obtained. Next the elastomer gel and mica are added into the melted wax/oil/pigment mixture with mixing. The vessel is then re-sealed and heated to return the mixture to the full melt temperature. Once melt temperature is reached the mixture is mixed until homogenous. The mixture is then poured into a mold and allowed to cool at room temperature. Once cooled, the mixture incorporated into the appropriate package.

The eyeliner is applied to the appropriate area around the eye to provide definition, color, moisturization and improved feel.

#### Example VII

A long wearing eye shadow of the present invention comprising cross-linked siloxane elastomer is prepared as follows:

<u>Ingredient</u>	<u>Wt %</u>
Pearl Mica CF	4.41
Glycerol Ester of Tall Oil Rosin	3.00

GE SFE 839 Cross-linked Siloxane Elastomer gel <sup>1</sup>	44.6
Polyethylene AC-617A	9.14
Beeswax White, Flakes	3.00
Propylparaben, NF	0.10
Tenox BHA	0.20
Phenoxyethanol	0.80
Talc 2755	3.00
Magnesium Carbonate 309	2.00
Glyceryl Tribehenate	3.42
Paraffin Wax	2.57
Silicone (SF-96-350 Type)	1.30
Vanillin	0.01
Lecithin, Liquid	0.54
Aluminum Starch Octenyl Succinate	5.00
Pigment	16.68
Total	100.00

<sup>1</sup> 5% Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone.

In a suitable vessel equipped with a heat source, the pearl mica CF, glycerol ester of tall oil rosin, GE SFE 839, polyethylene AC-617A, beeswax white flakes, propylparaben, Tenox  
5 BHA, phenoxyethanol, glyceryl tribehenate, paraffin wax, silicone oil, vanillin, lecithin, and aluminum starch octenyl succinate are added and heated with mixing using a Premier Mill Corp. Model 50 laboratory dispersator (Bench Scale Unit with simplex head) at between 10,000 to 16,000 rpms until a melt temperature of between 85 - 90°C is reached. While maintaining the heat, the mixture is mixed at a between 300 to 1,000 rpms until all waxes and rosin are melted  
10 and the mixture is homogenous. Still maintaining the heat, the pigments, talc and magnesium carbonate are added with mixing at a shear rate of between 10,000 to 16,000 rpms until homogeneous. The mixture is then poured into a mold and allowed to cool at room temperature. Once cooled, the mixture incorporated into the appropriate package.

The eye shadow is applied to the appropriate area around the eye to provide color,  
15 moisturization and improved feel.



Example VIII

A line-minimizing product that improves the appearance of skin texture is prepared as follows:

<u>Ingredient</u>	<u>Wt%</u>
DC9040 cross linked elastomer gel <sup>1</sup>	70.00
Cyclomethicone (DC245)	18.50
Ethylene acrylates copolymer (EA209)	5.00
Sucrose ester cottonate (SEFA)	5.00
Alkyl methicone (DC AMS C30 wax)	1.50
Total	100.00

5 In a suitable vessel equipped with a heating source, the AMS wax and the SEFA are added and heated to 75 deg C with gentle mixing. In a separate vessel, the EA209 particles and the DC245 (cyclomethicone) are added and mixed with gentle mixing to form an EA209/DC245 pre-mix. Once the wax/SEFA mixture is fully molten, the elastomer is added to this mixture with mixing until homogeneous. The wax/SEFA/elastomer mixture is mixed using a Heidolph (Model  
10 # RZR50) overhead stirrer, or equivalent, on low speed (about 50-100 rpms) whilst cooling the mixture to room temperature. Once at room temperature, the EA209 / DC245 pre-mix and the wax/SEFA mixture are combined and milled using a Turrax T25 on about 8000rpm until homogeneous. The resultant composition is then incorporate into an appropriate package.

The make-up is applied to provide improved texture and good feel.

Example IX

15

A line-minimizing product that improves the appearance of skin texture is prepared as follows:

<u>Ingredient</u>	<u>Wt%</u>
DC9040 cross linked elastomer gel <sup>1</sup>	70.00

Cyclomethicone (DC245)	18.50
Silica, titanium dioxide, iron oxide (Ronasphere LDP)	5.00
Isoeicosane (Permethyl 102A)	5.00
Alkyl methicone (DC AMS C30 wax)	1.50
Total	100.00

13% Dimethicone/vinyl dimethicone cross-polymer in  
cyclomethicone

In a suitable vessel equipped with a heat source, the AMS wax and the Permethyl are  
5 added and heated to 75 deg C with gentle mixing. In a separate vessel, the Ronasphere particles  
and the DC245 (cyclomethicone) are added and mixed with gentle mixing to form a  
Ronasphere/DC245 pre-mix. Once the wax/Permethyl mixture is fully molten, the elastomer is  
added to this mixture with mixing until homogeneous. The wax/Permethyl/elastomer mixture is  
mixed using a Heidolph (Model # RZR50) overhead stirrer, or equivalent, on low speed (about  
10 50-100 rpms) whilst cooling the mixture to room temperature. Once at room temperature, the  
Ronasphere/DC245 pre-mix and wax/Permethyl/elastomer mixture are combined and milled  
using a Turrax T25 on about 8000rpm until homogeneous. The resultant composition is then  
incorporate into an appropriate package.

The make-up is applied to provide improved texture, feel and a low level of color.

15

#### Example X

A line minimizing make-up that improves skin color and the appearance of texture is  
prepared as follows:

<u>Ingredient</u>	<u>Wt%</u>
DC9040 cross linked elastomer gel <sup>1</sup>	70.00
Cyclomethicone (DC245)	18.50

Silica, titanium dioxide, iron oxide (Ronasphere LDP)	5.00
Isoeicosane (Permethyl 102A)	5.00
Alkyl methicone (DC AMS C30 wax)	1.50
Iron oxides - silicone coated	2.00
Titanium dioxide - silicone coated	2.00
Total	100.00

<sup>1</sup> 13% Dimethicone/vinyl dimethicone cross-polymer in cyclomethicone

In a suitable vessel equipped with a heat source, the AMS wax and the Permethyl are added and heated to 75 deg C with gentle mixing. In a separate vessel, the Ronasphere, iron titanium dioxides and cyclomethicone (DC245) are added with gentle mixing to form a Ronasphere/iron oxides/titanium dioxide/DC245 pre-mix. Once the wax/ Permethyl mixture is fully molten, the elastomer is added to this mixture with mixing until homogeneous. The wax/Permethyl/elastomer mixture is mixed using a Heidolph (Model # RZR50) overhead stirrer, or equivalent, on low speed (about 50-100 rpms) whilst cooling the mixture to room temperature. Once at room temperature, the Ronasphere/iron oxides/titanium dioxide/DC245 pre-mix and the wax/ Permethyl mixture are combined and milled using a Turrax T25 on about 8000rpm until homogeneous. The resultant composition is then incorporated into an appropriate package.

The make-up is applied to provide improved texture, feel and a low level of color.

15

#### Examples XI - XIX

A makeup product is made that is suitable for application to the face to reduce the appearance of oily shine.

	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
<u>Ingredient</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
DC9040 Silicone	20.00	30.00	20.00	25.00	30.00	30.00	30.00	30.00	30.00
Elastomer Gel									

Cyclopentasiloxane	16.03	23.25	19.53	42.75	36.00	21.03	17.75	10.03	9.75
Isoeicosane	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Dimethicone Copolyol	0.50	1.00	-	-	0.75	1.50	2.00	4.00	8.00
Vitamin E Acetate	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Particulates									
Ethylene & Acrylic Acid Copolymer microspheres (EA209)	10.00	10.00	10.00	5.00	5.00	10.00	10.00	10.00	10.00
Silica and Titanium Dioxide and Iron Oxides (Ronasphere LDP)	2.00	-	-	5.00	2.00	5.00	5.00	5.00	5.00
Silica	3.00	3.00	2.00	-	-	-	-	-	-
Magnesium Aluminum Silicate	-	2.00	-	-	-	-	-	-	-
Allyl methacrylates copolymer	3.00		3.00		-	2.00	2.00	2.00	2.00
Acrylates copolymer	1.00	-	-	2.00	-	3.00	3.00	3.00	3.00
Nylon 12		5.00	1.00	-	2.00	-	-	-	-
Aluminum Starch Succinate	1.00	2.00	-	-	-	1.00	2.00	3.00	4.00
Treated powders*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Film-forming agents									
Polysilicone 7	17.00	-	17.00	-	-	-	-	-	-
Pressure Sensitive Adhesive	-	-	-	-	3.00	-	-	-	-
Silicone Resin	-	-	-	-	-	-	5.00	5.00	5.00
Solidifying agents									
Ozokerite	2.00	2.00	-	-	-	-	-	-	-
Stearyl Dimethicone	-	-	-	2.00	-	-	-	-	-
Humectants & skin- conditioning agents									

Glycerin	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Niacinamide	2.00	3.50	5.00	-	2.00	3.50	5.00	5.00	5.00
Panthenol	0.50	1.00	0.50	1.00	2.00	1.00	1.00	1.00	1.00
Preservatives									
Disodium EDTA	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Methyl Paraben	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Benzyl Alcohol	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Propyl Paraben	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Ethyl Paraben	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sunscreens									
Butyl Methoxydibenzoylmet hane	2.00	-	2.00	-	-	2.00	-	2.00	-
Octyl Salicylate	0.50	-	0.50	-	-	0.50	-	0.50	-
Octocrylene	1.00	-	1.00	-	-	1.00	-	1.00	-
Phenylbenzimidazole Sulphonic Acid	0.60	-	0.60	-	-	0.60	-	0.60	-
Triethanolamine	0.62	-	0.62	-	-	0.62	-	0.62	-
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

\*= Mixture of iron oxides and titanium dioxides

- In a suitable vessel equipped with a heating source, mix the DC9040, cyclomethicone (DC245), dimethicone copolyol, Isocicosane, vitamin E acetate and film formers until homogeneous. Next, add the preservatives and glycerine and skin conditioning agents to the above mixture and mix until homogenous. Heat the mixture to a temperature of between 85 - 90°C, at which time the solidifying agent (if used) should be added (melted into the mixture) with mixing until the mixture is homogenous. Add the particulate materials to the mixture and mix until homogeneous. Add the sunscreen materials if used and mix until homogeneous. Cool the mixture to room temperature. Once cooled, incorporate the mixture into the appropriate package.

Examples XX – XXVIII

A makeup product is made that is suitable for application to the face to reduce the appearance of oily shine.

	XX	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII
Ingredient	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%
DC9040 Silicone Elastomer Gel	20.00	30.00	20.00	25.00	30.00	30.00	30.00	30.00	30.00
Cyclopentasiloxane	15.36	22.58	18.86	42.08	32.33	21.86	19.08	13.36	17.08
Isoeicosane	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Dimethicone Copolyol (Abil EM 90)	0.50	1.00	-	-	0.75				
Vitamin E Acetate	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Particulates									
Silica and Titanium Dioxide and Iron Oxides (Ronasphere LDP)	2.00	-	-	0.00	0.00	5.00	5.00	5.00	5.00
Silica	3.00	3.00	2.00	-	-	-	-	-	-
Magnesium Aluminum Silicate	-	2.00	-	-	-	-	-	-	-
Allyl methacrylates copolymer	3.00		3.00		-	2.00	2.00	2.00	2.00
Acrylates copolymer	1.00	-	-	2.00	-	3.00	3.00	3.00	3.00
Nylon 12		5.00	1.00	-	2.00	-	-	-	-
Aluminum Starch Succinate	1.00	2.00	-	-	-	1.00	2.00	3.00	4.00
Titanium Dioxide	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25
Yellow Iron Oxide	2.41	2.41	2.41	2.41	2.41	2.41	2.41	2.41	2.41
Red Iron Oxide	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Black Iron Oxide	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Film-forming agents									

Polysilicone 7	17.00	-	17.00	-	-	-	-	-	-
Pressure Sensitive Adhesive	-	-	-	-	3.00	-	-	-	-
Silicone Resin	-	-	-	-	-	-	5.00	5.00	5.00
Solidifying agents									
Ozokerite	2.00	2.00	-	2.00	-	-	-	-	-
Humectants & skin- conditioning agents									
Glycerin	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Niacinamide	2.00	3.50	5.00	-	2.00	3.50	5.00	5.00	5.00
Panthenol	0.50	1.00	0.50	1.00	2.00	1.00	1.00	1.00	1.00
Preservatives									
Disodium EDTA	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Methyl Paraben	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Benzyl Alcohol	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Propyl Paraben	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Ethyl Paraben	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sunscreens									
Butyl Methoxydibenzoylme thane	2.00	-	2.00	-	-	2.00	-	2.00	-
Octyl Salicylate	0.50	-	0.50	-	-	0.50	-	0.50	-
Octocrylene	1.00	-	1.00	-	-	1.00	-	1.00	-
Phenylbenzimidazole Sulphonic Acid	0.60	-	0.60	-	-	0.60	-	0.60	-
Triethanolamine	0.62	-	0.62	-	-	0.62	-	0.62	-
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

In a suitable vessel equipped with a heating source, mix the DC9040, cyclomethicone (DC245), dimethicone copolyol, Iseicosane, vitamin E acetate and film forming agents until homogeneous. Next, add the preservatives, glycerine and skin conditioning agents to the above mixture and mix until homogenous. Heat the mixture to a temperature of between 85 - 90°C, at

which time add the solidifying agent (if used) and mix until the mixture homogenous. Add the particulate materials to the mixture and mix until homogeneous. Add the sunscreen materials if used and mix until homogeneous. Cool the mixture to room temperature. Once cooled, incorporate the mixture into the appropriate package.



## WHAT IS CLAIMED IS:

1. An anhydrous cosmetic composition characterized in that it comprises:
  - (i) at least one fatty or oil phase comprising:
    - (a.) from about 0.1 to about 10% of non-spherical crosslinked siloxane elastomer having a particle size of from above 10 to about 200 microns wherein the crosslinked siloxane elastomer is capable of swelling and absorbing greater than 30% by weight of a solvent fluid;
    - (b.) from about 10 to about 80% of a solvent for the crosslinked siloxane elastomer, wherein the solvent forms a gel with the crosslinked siloxane elastomer having yield point of at least 50 Pa;
  - (ii) from about 0.1% to about 10% of an emulsifier;
  - (iii) from about 0.1% to about 50% of a humectant
  - (iv) optionally, from 0 to about 50% of skin conditioning agent;
  - (v) from about 0.1% to about 30% pigment; and
  - (vi) from 0 to about 5% waterwherein the composition has a yield point of from about 100 to about 4000 Pa. and wherein the oil or fatty phase of the composition contains less than 10% by weight solid materials and further wherein the gel formed by the solvent and crosslinked siloxane elastomer provides an even, uniform distribution of the pigments in the film and, prior to film drying, the pigments are embedded in the film such that substantially no pigment resides on or protrudes through the surface of the film.
2. The anhydrous cosmetic composition of Claim 1 wherein the crosslinked siloxane elastomer is non-emulsifying.
3. The anhydrous cosmetic composition of Claim 1 wherein the skin conditioning agent is selected from the group consisting of exfoliants, emollients and mixtures thereof.
4. The anhydrous cosmetic composition of Claim 1 wherein the humectant is selected from the group consisting of propylene glycol, dipropylene glycol, polypropylene glycol, polyethylene glycol, sorbitol, hydroxypropyl sorbitol, hexylene glycol, glycerin, 1,3-butylene glycol, 1,2,6-hexanetriol, ethoxylated glycerin, propoxylated glycerin and mixtures thereof.

5. The anhydrous cosmetic composition of Claim 1 wherein said composition further comprises an emulsifier.
6. The anhydrous cosmetic composition of Claim 1 wherein the pigment is selected from the group consisting of talc, mica, magnesium carbonate, calcium carbonate, magnesium silicate, aluminum magnesium silicate, silica, titanium dioxide, zinc oxide, red iron oxide, yellow iron oxide, black iron oxide, ultramarine, nylon powder, polyethylene powder, methacrylate powder, polystyrene powder, silk powder, crystalline cellulose, starch, titanated mica, iron oxide titanated mica, bismuth oxychloride, pearl, pearl mica, interference pigments and mixtures thereof.
7. An anhydrous cosmetic composition according to Claim 1 wherein said composition is in the form of a foundation, mascara, concealer, eyeliner, brow color, eye shadow, blusher, lip paint or lipstick.
8. An anhydrous cosmetic composition characterized in that it comprises:
  - (i) at least one fatty or oil phase comprising:
    - (a.) from about 0.1 to about 10% of non-spherical crosslinked siloxane having a particle size of from above 10 to about 200 microns wherein the crosslinked siloxane elastomer is capable of swelling and absorbing greater than 30% by weight of a solvent fluid;
    - (b.) from about 10 to about 80% of a solvent for the crosslinked siloxane elastomer, wherein the solvent forms a gel with the crosslinked siloxane elastomer having yield point of at least 50 Pa;
  - (ii) from about 0.1% to about 10% of an emulsifier;
  - (iii) optionally, from 0 to about 50% of skin conditioning agent;
  - (iv) from about 0.01% to about 30% of organic spherical particles having a particle size of greater than 10 microns;
  - (v) from about 0.1% to about 30% pigment; and
  - (vi) from 0 to about 5% water

wherein the composition has a yield point of from about 100 to about 4000 Pa. and wherein the gel formed by the solvent and crosslinked siloxane elastomer provides an even, uniform distribution of the pigments in the film and, prior to film drying, the

pigments are embedded in the film such that substantially no pigment resides on or protrudes through the surface of the film.

9. An anhydrous composition characterized in that it comprises:

(i) at least one fatty or oil phase comprising:

(a.) from about 0.1 to about 10% of non-spherical crosslinked siloxane having a viscosity of from above 20,000 to about 6,000,000 cps wherein the crosslinked siloxane elastomer is capable of swelling and absorbing greater than 30% by weight of a solvent fluid;

(b.) from about 10 to about 80% of a solvent for the crosslinked siloxane elastomer, wherein the solvent forms a gel with the crosslinked siloxane elastomer having yield point of at least 50 Pa;

(ii) from about 0.1% to about 10% of an emulsifier;

(iii) optionally, from 0 to about 50% of skin conditioning agent;

(iv) from about 0.1% to about 30% pigment; and

(v) from 0 to about 5% water

wherein the composition has a yield point of from about 100 to about 4000 Pa. and wherein the oil or fatty phase of the composition contains less than 10% by weight solid materials and further wherein the gel formed by the solvent and crosslinked siloxane elastomer provides an even, uniform distribution of the pigments in the film and, prior to film drying, the pigments are embedded in the film such that substantially no pigment resides on or protrudes through the surface of the film.

10. The anhydrous cosmetic composition of Claim 1 wherein said composition further comprises an active selected from the group consisting of a sunscreen active, a film forming agent, a shine control agent, and combinations thereof.

(19) World Intellectual Property Organization  
International Bureau



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IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,  
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**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG)*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*
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(54) Title: **ANHYDROUS COSMETIC COMPOSITIONS**

(57) Abstract: An anhydrous skin treatment composition is provided which includes a crosslinked siloxane elastomer gel of specific yield point, a skin conditioning agent and a volatile siloxane. Inclusions of the select elastomers provide improved uniform distribution of the pigments.

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## INTERNATIONAL SEARCH REPORT

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 A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 A61K7/02 A61K7/48 A61K7/021

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

 Minimum documentation searched (classification system followed by classification symbols)  
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 849 314 A (ROSE WALTER ET AL) 15 December 1998 (1998-12-15) column 3, line 14 - line 59; claims 1,5,7	1-4,8,9
A	EP 0 608 989 A (PROCTER & GAMBLE) 3 August 1994 (1994-08-03) page 3, line 15 - page 4, line 32; claims 1,2,4,14	1-10
A	EP 0 790 055 A (OREAL) 20 August 1997 (1997-08-20) page 3, line 51 - line 56; claims 1-3,5; example 1	1,7-10
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- \*G\* document member of the same patent family

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## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI Section Ch, Week 198641 Derwent Publications Ltd., London, GB; Class A96, AN 1986-267848 XP002019603 &amp; JP 61 194009 A (TORAY SILICONE CO LTD), 28 August 1986 (1986-08-28) abstract</p> <p>-----</p>	1,8

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 01/21609

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5849314	A	15-12-1998	AU 3094897 A CA 2257570 A1 WO 9800105 A1 EP 0914086 A1 JP 2000513367 T US 5833973 A ZA 9705623 A	21-01-1998 08-01-1998 08-01-1998 12-05-1999 10-10-2000 10-11-1998 28-12-1998
EP 0608989	A	03-08-1994	EP 0608989 A2	03-08-1994
EP 0790055	A	20-08-1997	FR 2744911 A1 AT 192330 T BR 9700264 A OE 69701820 01 OE 69701820 T2 EP 0790055 A1 ES 2148911 T3 JP 9227332 A US 5919468 A	22-08-1997 15-05-2000 27-10-1998 08-06-2000 12-10-2000 20-08-1997 16-10-2000 02-09-1997 06-07-1999
JP 61194009	A	28-08-1986	JP 1812897 C JP 4017162 8	27-12-1993 25-03-1992